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ABSTRACT

The activities in this booklet were designed to provide second grade children with opportunities to explore areas of natural interest to them while gaining knowledge and practice in math skills and with science processes. Seasonal activities which are appropriate for the first half of the school year are offered on the topics of: holidays, seeds and food, leaves and trees, weather and color, as well as other science-related topics. Explanations are given on graphing skills and questioning techniques and a listing of ten mathematics skills and eight science processes is also presented. Each activity consists of student sheets and a teacher's guide. Information provided for the teachers on each activity includes: (1) the topic area; (2) introductory statement; (3) the math and science skills addressed; (4) materials needed; (5) key questions; (6) background information; (7) management details; (8) instructional procedures; (9) student procedures; (10) discussion questions; (11) activity extensions; and (12) curriculum coordinates. (ML)

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Bk. A

PROJECT AIMS

SEASONING MATH AND SCIENCE

FALL & WINTER

SECOND GRADE

ACTIVITIES THAT INTEGRATE MATH AND SCIENCE

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Seasoning Math and Science

EDITORS

Arthur Wiebe
Project Director
Fresno Pacific College

Larry Ecklund
Project Director
Fresno Pacific College

Judith Hillen
Associate Project Director
Fresno Pacific College

PROJECT FACILITATOR

Sheldon Erickson
Fresno Pacific College

ILLUSTRATOR

Betsy Olson

WRITING TEAM

Cherie Ginocchio
2nd Grade Teacher
Denair Unified School District
Denair, California

Nancy Newton
2nd Grade Teacher
Stockton Unified School District
Stockton, California

Ruth Haggard
2nd Grade Teacher
Farmersville Unified School District
Farmersville, California

Betsy Olson
Science Resource Teacher
Coalinga Unified School District
Coalinga, California

Sherry Jenkins
2nd Grade Teacher
Madera Unified School District
Madera, California

Wendy Roberts-Worley
2nd Grade Teacher
Central Union School District
Lemoore, California

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Introduction

Primary teachers struggle to include a diversity of subjects into a limited amount of time. The activities in this booklet integrate Math Skills and Science Processes. Incorporating these science and math lessons into the curriculum enables a teacher to use time more efficiently.

Discovery through a hands on experience is exciting, mind opening and motivating. These 21 activities provide an approach which allows second grade children to explore areas of natural interest to them, while gaining knowledge and practice in math skills.

Cleaning a pumpkin and carving a jack-o-lantern are not often considered educational experiences. Children consider frosting cookies and gathering leaves a playful activity. The investigations included in this series turn such activities into an opportunity for a student to master the skills of estimation, graphing and problem solving.

The first booklet at this grade level includes activities which are most appropriate for the first half of the school year. Included are such topics as Holidays, Plants, Weather, Color and Light. As writers of these activities we found them to be very enjoyable and successful in our own classrooms. However, feel free to adjust and extend them to meet the needs and interests of your students.

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Seasoning Math and Science

GRAPHING

Many of the investigations presented in the second grade series of Project AIMS involve a variety of graphing activities.

Graphing is an invaluable technique that allows integration of many areas of the curriculum, which lends itself most readily to the integration of mathematics and science. It provides children with an opportunity to actively participate in problem solving experiences, from the concrete to the abstract.

The following mathematics skills are used in graphing:

- attributes
- counting
- comparing (greater and fewer, more and less)
- estimating
- interpreting data
- logical thinking
- measuring
- one-to-one correspondence
- ordinal numbers
- predicting
- problem solving
- recording data
- sets
- sorting
- tabulating
- whole number computation

The following science processes are used in graphing:

- observing and classifying
- measuring
- estimating
- controlling variables
- gathering and recording data
- interpreting data
- applying and generalizing

There are three types of graphs used in investigations: real, representational and abstract.

Real graphs are the basis for building the concept of graphing. Students use manipulative objects with which to graph. They do not use drawing or other symbols. These graphs are usually done on a large area of floor or a table top.

Some examples of real graphs are:

1. People graph—students stand in boy and girl lines
2. Shoe graph—students take off shoes, place on floor next to appropriate word or picture (i.e. buckles, ties, boots)
3. Apple graph—students bring apples, graph by color

None of the lessons in this booklet use real graphs. If you would like your class to have a real graph experience these lessons can be easily adapted:

Litter, Litter Everywhere
Let's Get Corny

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Representational graphs are the pictorial method of graphing. Students use pictures of the real object with which to graph. These graphs are usually placed on a wall or bulletin board.

Some examples of representational graphs are:

1. People graph—students draw pictures of themselves and place in appropriate line
2. Shoe graph—students draw pictures of own shoes and place under appropriate word or picture (see example above)
3. Apple graph—students draw pictures of own apple and place under matching color

Some activities that could be adapted to use representational graphs are:

Let's Get Corny
Weather Or Not

Abstract graphs are the symbolic method of graphing. Students use symbols with which to graph, instead of real objects or pictures. These graphs are also placed on a wall or bulletin board, but in this booklet are most often found in the student worksheets.

Some examples of how abstract graphs may be used on a bulleting board are:

1. People graph—students use letter symbols to graph (i.e. B for boy and G for girl)
2. Shoe graph—students use different colored squares for graphing (i.e. red for buckles, yellow for ties, blue for boots)
3. Apple graph—students use different colored circles for graphing (i.e. red, green, yellow)

The abstract graphs on the worksheets are most often in the form of bar graphs. Each box represents a specified number of objects or measurement. The student fills in the appropriate number of boxes in each column.

Some examples of abstract graphs found in this book are:

The Great Pumpkin
Let's Get Corny
Don't Leaf Me Alone

Students need a great amount of experience with all three types of graphing. It is best if students move from real graphs through representational graphs and finally to abstract graphs. However, as they gain experience, this is not always necessary.

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QUESTIONING TECHNIQUES

After the graphs have been made a great many math concepts can be reinforced by using good questioning techniques. We have not incorporated these techniques into each individual lesson. However, we are giving you some suggestions for ideas that can lead the children into questions that will develop their thinking skills.

The initial questions should focus the child's attention on the graph.

Graphing the weather for a month as in "Weather or Not" leads to the following types of questioning.

"Which type of weather did we have the most?"
"Which type of weather did we have the least?"

The second step would be interpreting the information on the graph through comparisons.

Such questions might include:

"How many more/less sunny days did we have than rainy days?"
"How many days did we not have sunshine?"

The third step in questioning is application of the information on the graph.

Questions might include:

"What would you expect the weather to be like next year at this time?"
"Would you plan for a picnic for this month? Why or why not?"
"Would you expect the graph to look the same for a different month?"

Using this form of questioning with any of the graphing lessons will extend the learning involved for you and your students. Given the opportunity your students will think of many more questions than you will. Give them a chance.

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Project AIMS

Project AIMS has as its purpose the integration of subject matter in K-9. Such integration enriches and makes learning meaningful and holistic. Project AIMS began as a program to integrate mathematics and science, but has since developed to also include language arts, social studies, and other disciplines. The acronym "AIMS" stands for "activities to integrate mathematics and science."

Project AIMS is a continuing, non-profit project of Fresno Pacific College. It had its inception in a National Science Foundation funded program to train teachers in the integration of mathematics and science. This quickly created the necessity to write instructional materials incorporating this concept. Despite the fact that thoughtful educators have long recommended this approach, very little appropriate material was available.

Currently, Project AIMS is funded solely through the sale of this developing series of books. All net proceeds from their sale flow into a trust fund administered by Fresno Pacific College. The use of this fund is restricted to the support of continued research and development, partial scholarships for classroom teachers who participate in the writing and field testing teams, and the publication of the books.

Two writing teams have completed their work. The first consisted of seventy-five teachers in grades 5-9 who met over a period of eighteen months. The second involved thirty-five K-4 teachers who wrote during a two-year span. In the fall of 1985 a third team of approximately fifty teachers in grades 2-9 will begin writing. In addition, over a hundred teachers have been involved in field testing newly created materials.

The rationale for this integrative thrust lies in the fact that science, mathematics, language arts, social studies, etc., are integrally interwoven in the real world outside the classroom, from which it follows that they should be similarly treated in the classroom if we are to prepare our students for life in that world. Teachers who have used Project AIMS lessons give enthusiastic endorsement to the effectiveness of this approach.

Science encompasses the art of questioning, investigating, hypothesizing, and discovering. Mathematics is the language that provides clarity, objectivity, and understanding. The language arts provide us with powerful tools of communication. Many of the major contemporary issues involve societal issues stemming from advancements in science. It is time, therefore, that all of us in the teaching profession take seriously using a more holistic mode of transmitting knowledge to students. It is this that motivates all of us who are involved in creating or using the integrative materials of Project AIMS. We invite you to join us in this effort.

Extensive field testing of these materials confirms the following beneficial results.

1. Mathematics becomes more meaningful, hence more useful, when it is applied to situations that interest students.

2. The extent to which science is studied and understood is increased, with a significant economy of time resulting from the integration of two or more disciplines.

3. There is improved quality of learning and retention, supporting the thesis that learning which is meaningful and relevant is more effective.

4. Motivation and involvement are increased dramatically as students investigate real world situations and participate actively in the process.

We invite you to become part of this classroom teacher movement by using an integrated approach and by sharing any suggestions you may have or investigations you would recommend. Project AIMS welcomes you!

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I HEAR, AND I FORGET

I SEE, AND I REMEMBER

I DO, AND I UNDERSTAND

–Chinese Proverb

Project AIMS Publications

GRADES 5-8 SERIES

Math + Science, A Solution
The Sky's the Limit
From Head to Toe
Fun With Foods
Floaters and Sinkers
Down to Earth
Our Wonderful World
Pieces and Patterns, A Patchwork in Math and Science

GRADES K-4 SERIES

Fall Into Math and Science
Glide Into Winter With Math and Science
Spring Into Math and Science
Seasoning Math and Science, Book A (Fall and Winter)
Seasoning Math and Science, Book B (Spring and Summer)
Jawbreakers and Heartthumpers
Hardhatting in a Geo-World
Popping With Power
Overhead and Underfoot

FOR FURTHER INFORMATION WRITE TO:

Project AIMS
Fresno Pacific College
1717 S. Chestnut Ave.
Fresno, California 93702

CREATURE FEATURE

I. **Topic Area**

Weighing Food Items

II. **Introductory Statement**

Students will weigh and record food items that will be used to make a creature.

III. **Math Skills**

a. Weighing
b. Estimating
c. Predicting

Science Processes

a. Recording data
b. Weighing
c. Observing
d. Estimating

IV. **Materials**

oranges—1 per student
cucumbers—2
nuts
napkins
knife
celery—4 stalks
bananas—3
carrots—3
grapes—1 bunch
raisins—1 small box
apples—2
toothpicks—1 box
scale
Student worksheet for the measuring

V. **Key Question**

How much do you think these items weigh? How much do the items actually weigh?

VII. **Management**

1. The students brought the food items.
2. Each group of 4-8 will need a scale.
3. Everything was sliced or cut ahead of time.
4. The students will take turns measuring items for their group.
5. This lesson should be done in two parts. (20-30 minutes per part)
6. *Part I*
   a. Estimating and recording the weight of each item.
   b. Weighing and recording the weight of each item.
   c. Store the vegetables and fruits in closed containers to be used for the next day.

Part II

a. Make the creatures.
b. Measure the whole creature.

VIII. **Procedure**

Part I

1. The students will estimate how much the 2 celery slices weigh. They will record their estimation.
2. One student will weigh the celery slices.
3. All students will record their answers.
4. Continue above procedure for all the items.

Part II

1. Using an orange as a head, each student will make a creature by adding any of the weighed items. Use toothpicks to attach the items to the orange.
2. Each student will estimate how much their creature weighs and record their estimate.
3. Each student will weigh their creature and record the weight.

X. **Discussion**

1. Which item did you think would weigh the most? Why?
2. Which item did weigh the most?
3. Which item weighed the least?
4. Were you surprised by the weights?

XI. **Extensions**

1. Arranging the creatures of the whole class in order starting with the greatest weight.

XII. **Curriculum Coordinates**

Language

1. Naming and writing about the creature.

Nutrition

1. All food items were natural foods. Good to use on No Sugar Day.

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CREATURE FEATURE

Name:

Items to Be Weighed	Estimation	Actual
2 Celery Slices		
2 Cucumber Slices		
2 Banana Slices		
2 Apple Slices		
5 Raisins		
5 Carrot Slices		
5 Nuts		
5 Grapes		
10 Toothpicks		
1 Orange		

My Creature

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The Great Pumpkin

I. **Topic Area**
Seeds

II. **Introductory Statement**
Students will estimate the number of seeds in a pumpkin, find out the actual number, then use that data to predict the amount of seeds in other pumpkins.

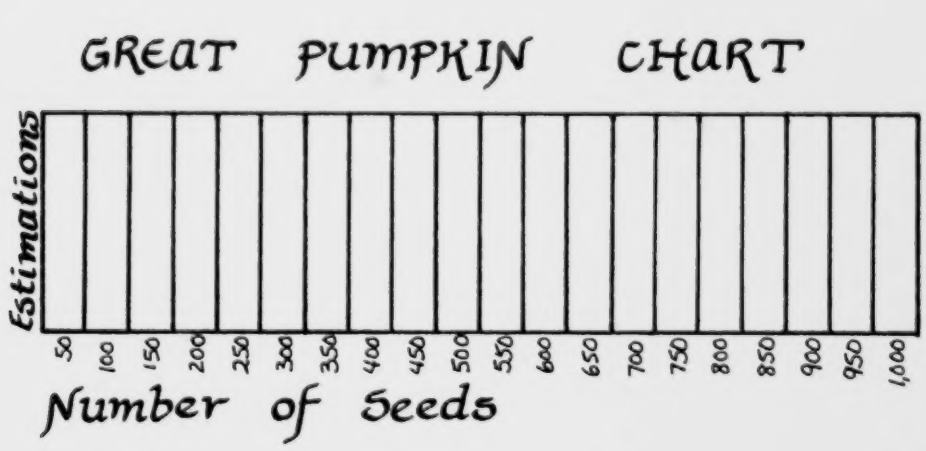
III. **Math Skills**
a. Whole number computation
b. Graphs
c. Counting
d. Place value

Science Processes
a. Estimating, gathering, & recording data
b. Applying and generalizing data

IV. **Materials**
4 pumpkins: 2 the same size
1 larger
1 smaller
Newspaper (to cover desks)
Knife
Spoons
Bowl
Area to wash up
Class chart (see background)

V. **Key Questions**
1. How many seeds are in a given pumpkin?
2. How will the amount of seeds vary in comparison with the size of the pumpkin?

VII. **Management**
1. Have the work centers well covered with newspapers.
2. The teacher should cut the top out of the pumpkins to avoid any problems with the students and knives.
3. This activity will take approximately 40 minutes.
4. Divide the class into 4 groups.
5. A good way to set up the chart is to have one chart for each pumpkin. The chart should range from 0 to 1,000 at intervals of 50. Each student should have 4 squares of paper for their estimations.



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VIII. **Procedure**

1. Hold up a pumpkin (one of the middle sized ones). Ask students to think about the seeds in the inside. Have them guess how many seeds there are and record their estimation on the class chart.
2. Cut open your pumpkin and have a group of students clean out the inside, separating the seeds from the pulp. (Have the rest of the class working on an alternate assignment.) Have the group with the pumpkin separate their seeds into piles of 10 for easier counting.
3. Bring the attention of the whole class back to the pumpkin seeds. Discuss how you will be counting by 10's and that 10 groups of 10 equals 100.
4. Have the class count together (by 10's) the number of seeds and you (the teacher) record the number on the chart.
5. Discuss the difference between the student's predictions and the actual amount of seeds.
6. Hold up a new pumpkin that is larger than the first. Have the students guess whether there will be more, less, or the same amount of seeds as in the smaller one. The students will record their estimation on the chart.
7. Continue the process in #6 with a smaller and a same size pumpkin as the original pumpkin.
8. Divide the remainder of the class into 3 groups (having the students who previously counted seeds, work on the alternative assignment). Send each group to their own work center.
9. Give each group one of the pumpkins (with the top cut out), to clean out, separating seeds from pulp. Students should divide the seeds into piles of tens and add up the total.
10. When each group has completed their calculations and have washed up (saving their seeds in bowls), bring all the information together for recording and discussing. Discuss whether there was any correlation between the size and the number of seeds. "What can you assume about the number of seeds in other pumpkins using this information?"

XI. **Extensions**

1. Students may measure and compare the seeds by weight.
2. Students may weigh the different parts of the pumpkins (body, seeds, and pulp).
3. Do the same experiment with different fruits or vegetables such as watermelon, squash, etc.

XII. **Curriculum Coordinates**

Art

1. Dye seeds
   —string for necklace
   —use for mosaic
   —crayon rubbings
   —vegetable prints
   —draw vegetables inside and out
   —paper mache pumpkins

Music

1. Halloween music
   —Five Little Pumpkins
   —I Made a Jack-O-Lantern
   —In a Pumpkin Patch

Social Studies

1. Indian Lore
   —cooking
   —pumpkin seeds
2. Thanksgiving
   —cooking
   —pumpkin pie

Language Arts

1. Finger Play—Five Little Pumpkins

Physical Education

1. Relays—Pumpkin seeds on a spoon-drop into cup.

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OH CHRISTMAS TREE

I. **Topic Area**
Plant Growth

II. **Introductory Statement**
Students will observe and measure the growth of grass seeds.

III. **Math Skills**
a. Measurement in metric units
b. Graphs

Science Processes
a. Observing and classifying
b. Estimating
c. Gathering and recording data

IV. **Materials**
Pine cones (one for each student
Potting soil
Grass seeds
Large bucket or container or water
Dixie cups 3 oz (bathroom size)
Student chart
Pans (aluminum pie plates, styrofoam meat trays, etc. one for each dent to set pinecone in)
Clay
Spray bottle

V. **Key Questions**
How much will the grass seeds grow and how long will it take?

VII. **Management**
1. Allow a few weeks for seeds to grow.
2. Best if set up at a station.

VIII. **Procedure**
1. When the group arrives at the station have each child pick a pinecone.
2. Students will place all their pinecones in the bucket of water and will take turns holding the pinecones under the water.
3. When a child is not holding the pinecones, he/she should be measuring one full dixie cup of soil and one half dixie cup of seeds. He/she should also get a tray or pan.
4. Each student will retrieve his/her pinecone from the water. They are to then stand them up in their tray (using clay if necessary) and sprinkle evenly with their cup of soil. The students are then to sprinkle their grass seeds over their pinecones. Label each tray with their name.
5. Students will be responsible for keeping the trays with their pinecones filled with water, and their pinecones damp with a mister.
6. Students will measure and record the growth of their seeds every other day, over a two or three week period.
   a. Students take a centimeter ruler and measure the height of the grass and record the date and measurement of the picture data table.
   b. Students draw in the grass as it appears on the actual pinecone. Encourage students to be observant of the proportions when drawing.
   c. Have students record date and actual measurement on the bar graph.

X. **Discussion**
1. What does a seed need to grow?
2. Why does some grass grow faster than others?

XI. **Extensions**
1. This activity can also be done with succulant plants instead of grass seeds.
2. This activity can be changed to an Easter activity by planting the grass seed in an egg shell filled with soil. A student worksheet has been provided for you.
3. This activity can also be changed to be a St. Patrick's Day activity by sprinkling the seeds on a shamrock shaped sponge.

XII. **Curriculum Coordinates**
Art
1. Pictures of Christmas Trees
Music
1. "Oh Christmas Tree"
Language
1. Creative Writing
2. Christmas Stories

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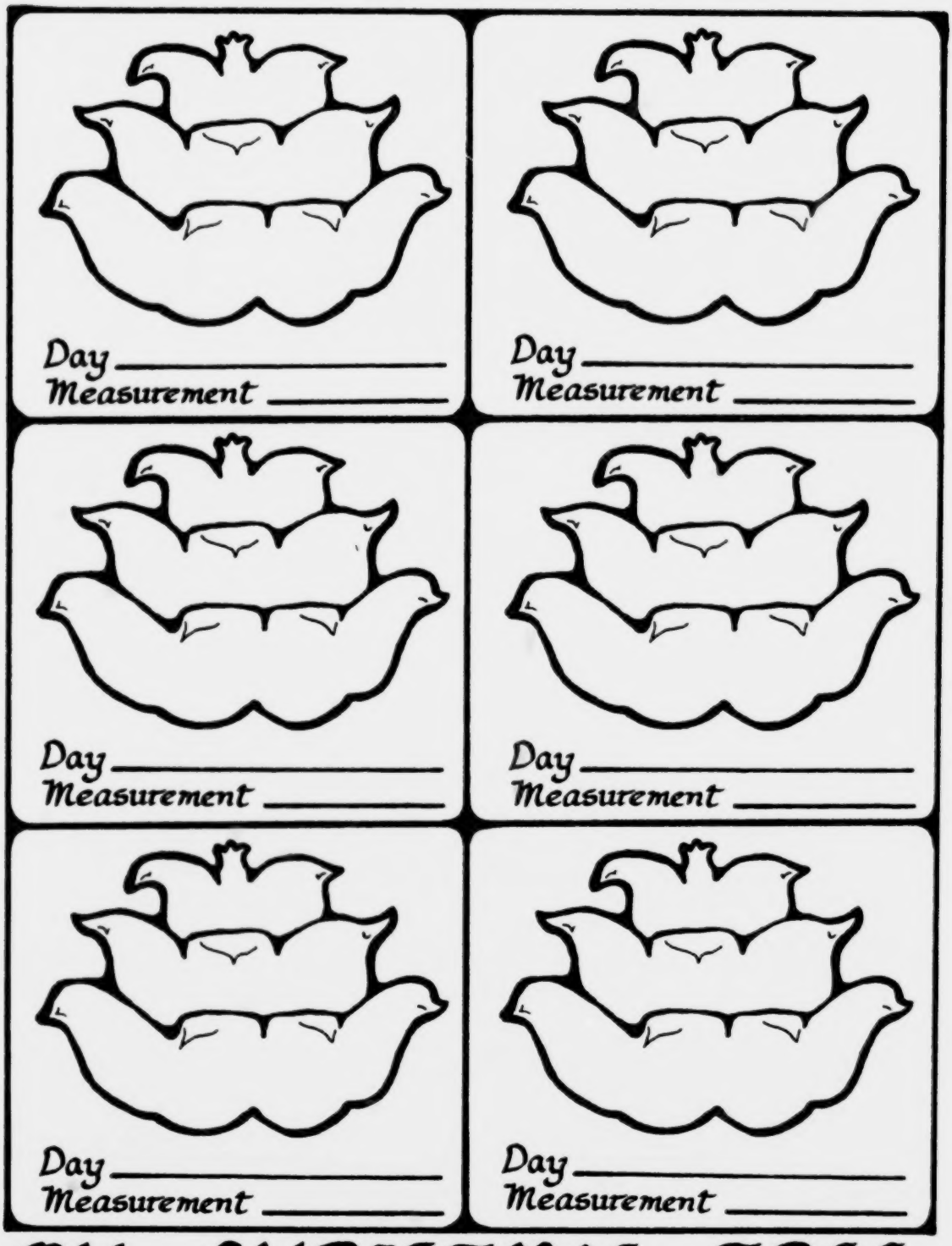

OH CHRISTMAS TREE

Name _____

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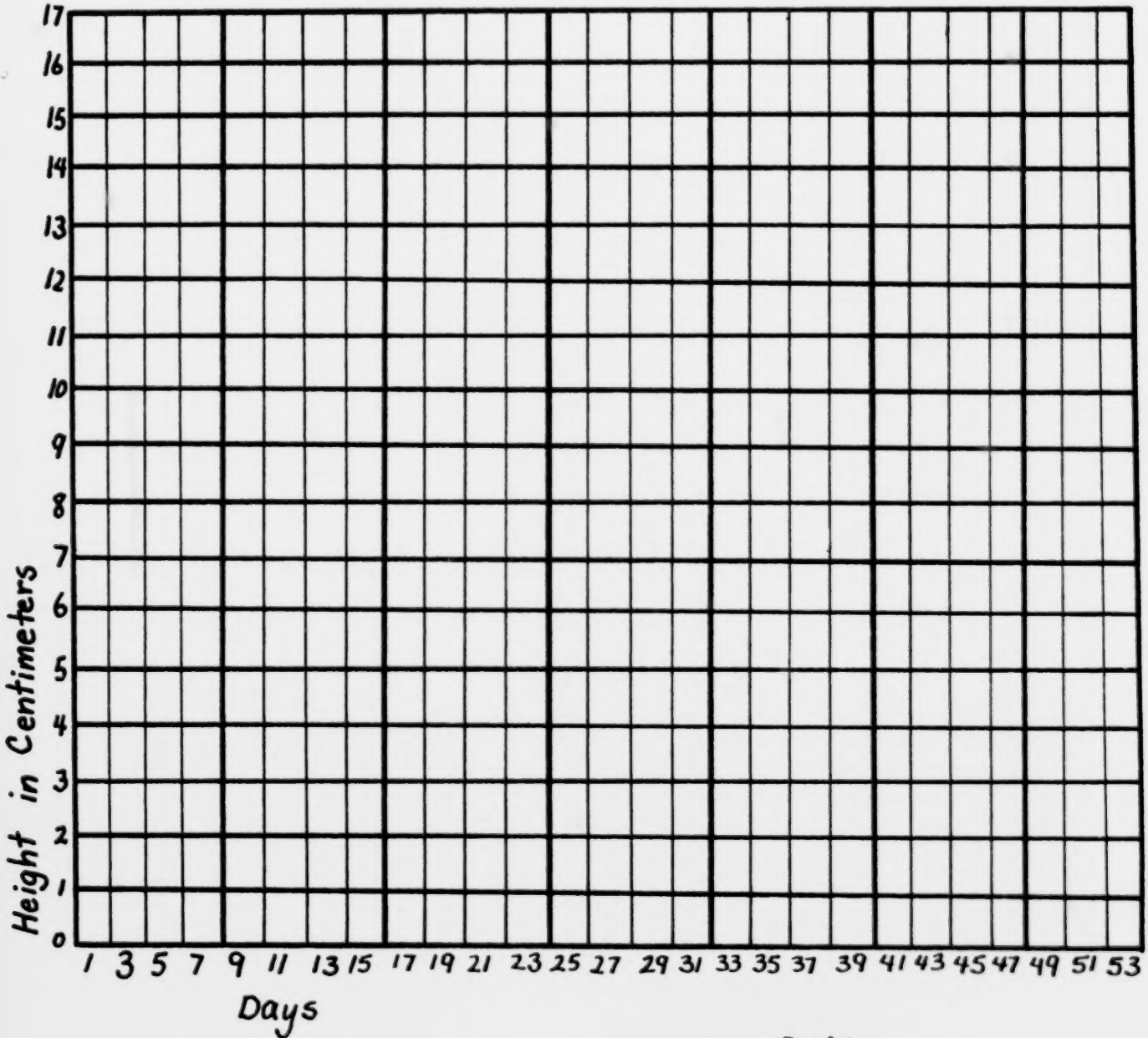
OH CHRISTMAS TREE

Name _____

Fill in one centimeter square for each centimeter of height of your grass.



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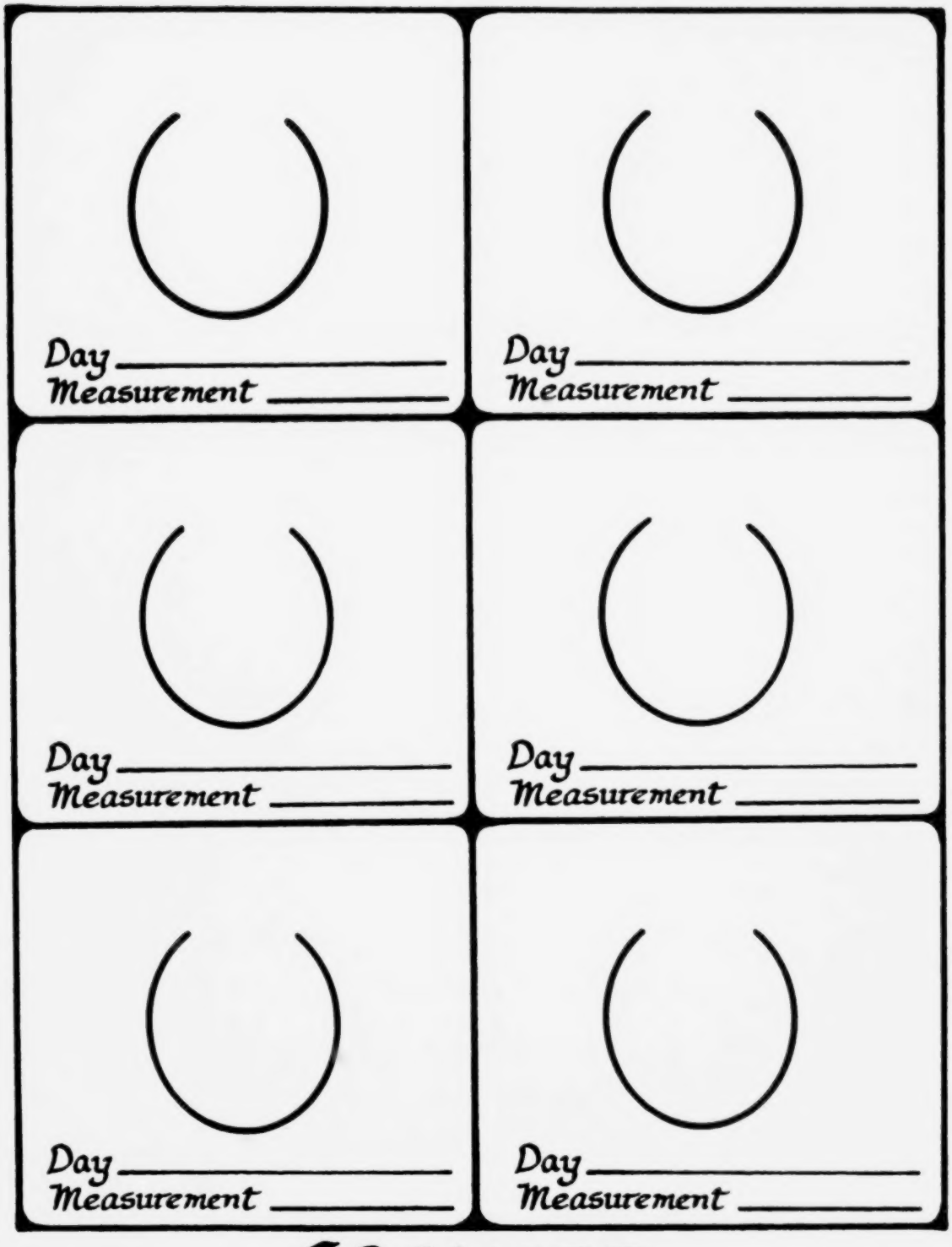

EGGHEAD

Name _____

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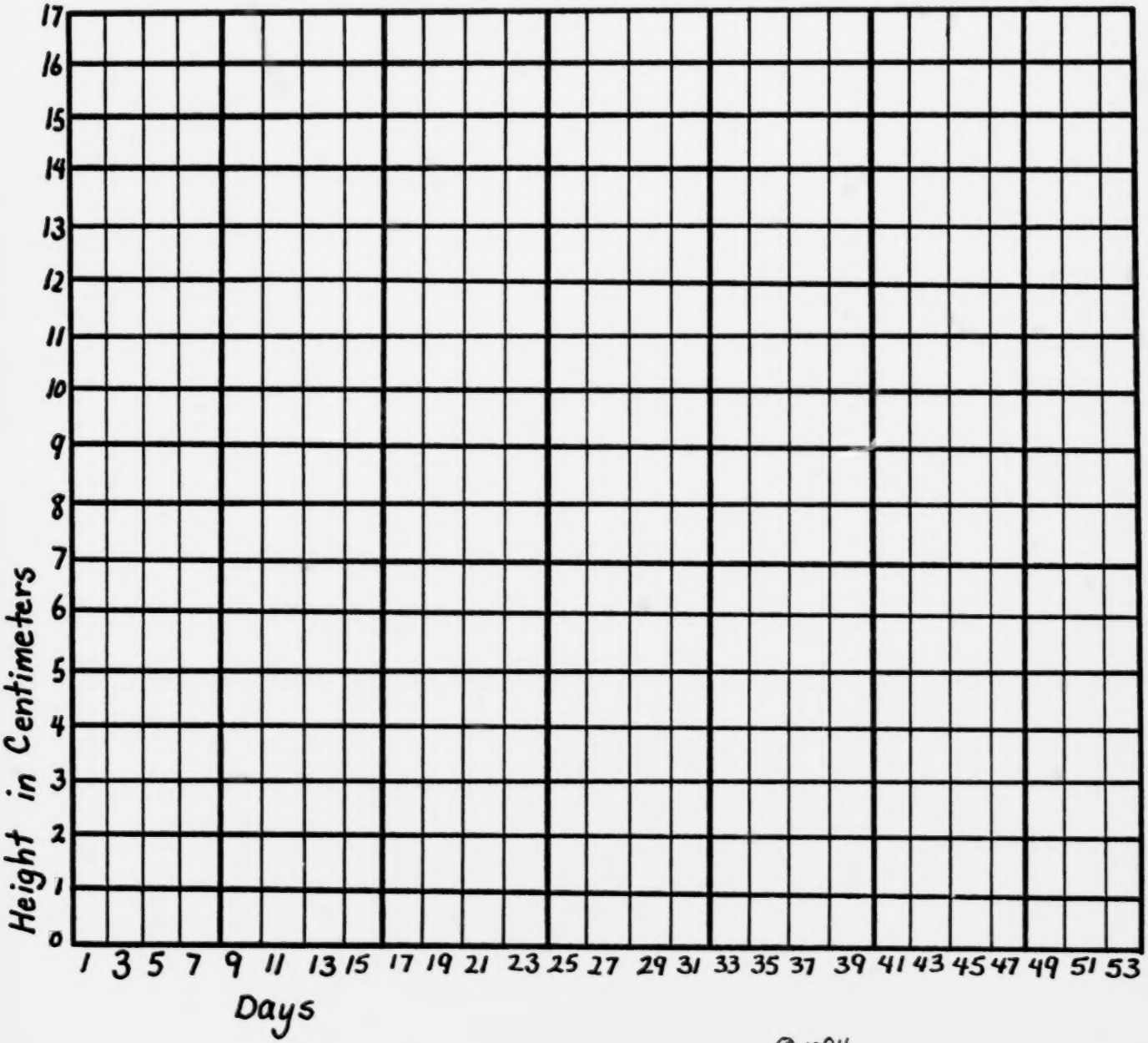
EGGHEAD

Name _____

Fill in one centimeter square for each centimeter of height of your grass.



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THE SEED WITHIN

I. **Topic Area**

Seeds—comparison

II. **Introductory Statement**

Students will observe likenesses/differences among various seeds.

III. **Math Skills**

a. Counting
b. Shapes
c. Sequencing (seed sizes

Science Processes

a. Observing
b. Collecting/Recording data
c. Comparing

IV. **Materials**

Fresh fruits/vegetables that contain seeds
Sharp knife
Paper towels, napkins, or plates
Student page
Large copy/transparency of student page

V. **Key Question**

In what ways are seeds the same or different?

VII. **Management**

1. This lesson could be completed in approximately one hour.
2. You might use part of the class as counters while the rest of the class is doing another activity.
3. Tomato seeds are very messy and are not recommended.
4. Seeds may be mounted on paper to pass around or displayed on a table.
5. The discussion for #7 under procedures might need teacher direction to get started. You can sort color by brown and not brown, etc. Size of seeds could be tiny and not tiny, etc. Shapes of seeds could be round, not round, or flat, not flat. The students will then be able to decide which attribute they will use on their chart.

VIII. **Procedure**

1. Introductory discussion
   a. How do plants start?
   b. Where do we get the seeds?
   c. Do all plants have the same number of seeds?
   d. Are all seeds the same?
   e. In what ways are seeds the same or different?
2. Teacher will show the fruit and vegetables to the class and list on the large copy or transparency of student page.
3. Teacher will cut the fruits and vegetables and distribute the pieces to the students for counting.
4. Students will count the seeds.
5. Teacher or students will record the number of seeds for each fruit/vegetable on the large copy or transparency.
6. Allow time for all students to observe the seeds before continuing.
7. Class will fill in student page while discussing color, size, and shape of seeds.
8. Students will sequence seeds from largest to smallest.

X. **Discussion**

1. Were the seeds all the same?
2. How were the seeds different?
3. Does the size of a seed tell you the size of the plant? The size of the fruit or vegetable?
4. Which of these seeds do we usually eat?

XI. **Extensions**

1. Students could try growing the seeds they removed.
2. Other types of seeds could be brought in for comparison.

XII. **Curriculum Coordinates**

Language Arts

1. Oral discussion
2. Experience stories

Social Studies

1. Study of crops grown in area

Art

1. Seed mosaic

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Name

THE SEED WITHIN

Fruit/Vegetable		Number of Seeds	Seed Color	Seed Size	Seed Shape
1					
2					
3					
4					
5					
6					

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HOW DRY I AM?

I. **Topic Area**

Plants—physical changes of fruits and vegetables through dehydration.

II. **Introductory Statement**

Students will observe and measure changes in fruits and vegetables caused by dehydration.

III. **Math Skills**

a. Weighing
b. Estimating
c. Subtracting
d. Graphing

Science Processes

a. Observing
b. Comparing
c. Estimating
d. Recording data

IV. **Materials**

Fruits and vegetables—apple, pear, carrot, zucchini, onion
Scales—kitchen or balance with weights
Knife
Area for dehydrating fruits/vegetables
Racks for dehydrating—use cake or cookie cooling racks
Student pages

V. **Key Question**

How much weight will these fruits and vegetables lose when they are dehydrated (dried out)?

VI. **Background**

Fruits and vegetables may be dehydrated in one of two ways. This choice will depend on time and space available. The first method gives the class a better chance to observe the changes.

Method 1—Thinly slice the vegetables/fruits and place on racks or plates to air dry. It should take approximately 3 or 4 days depending on the weather conditions. This allows the children to watch gradual changes. Disadvantages to this method is the space involved and possible problems with mice, ants, flies, etc.

Method 2—Thinly slice the vegetables/fruits and dry in a dehydrator if available. A convection oven or regular oven may also be used. The oven should be set at 100°-125° and it will take 7-8 hours. The door must be left slightly ajar for the moisture to escape.

VII. **Management**

1. The lesson will take two class sessions of approximately 30 minutes each. One lesson will be to weigh and record the fruits and vegetables before drying. The second lesson will follow whenever the dehydration has been completed.
2. When weighing the first time weigh only what you are going to dehydrate. If you are going to pare and core the fruit/vegetable for dehydrating (this is not necessary) then do it before the first weighing.

VIII. **Procedure**

First Lesson

1. The class observes the fruits and vegetables.
2. Introductory discussion
   a. When you bite into some fruits and vegetables you have to be careful or something can drip all over you. What is this?
   b. How much of a fruit or vegetable is juice/liquid?
   c. How can we find out?
   d. What would happen if we dehydrated them? (could discuss root word hydra- as in hydrant, hydraulic, hydro-electric, etc.)
3. Weigh the fruits/vegetables.
4. Record data on student sheets.
5. Prepare fruits/vegetables for dehydration
   a. clean
   b. thinly slice

Dehydrate by method selected

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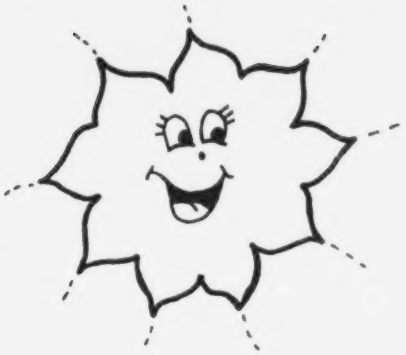


Second Lesson—after foods have been dehydrated.

1. Observe the dehydrated fruits and vegetables.
   a. Do they look like the slices we had at the first lesson?
   b. How are they different?
   c. How much weight do you think they lost? (estimates may be made orally, written on the board, recorded on a large graph as allows)
2. Weigh the dehydrated fruit/vegetables.
3. Record the data.
4. Subtract to find out how much weight was lost.
5. Graph the amount of weight lost.
6. If dehydration was sanitary enough allow the class to sample the dehydrated products.

IX. **What the Students Will Do**

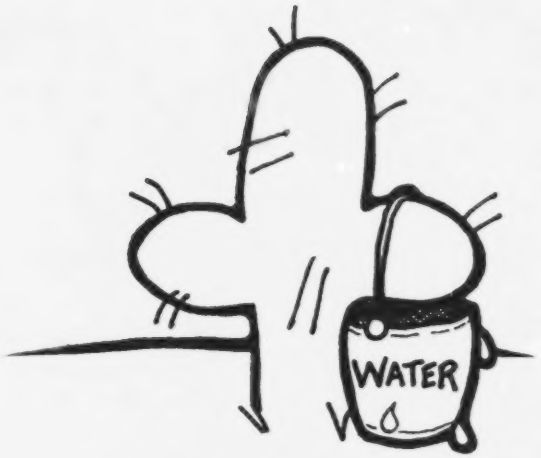
Included in procedures.

X. **Discussion**

1. When you eat some foods are you eating mostly solids or liquids?
2. What foods do we buy that are already dehydrated for us?

XI. **Extensions**

1. Try comparisons of drying areas—i.e. by a sunny window versus a shaded cool area.
2. Place slices on different materials to compare dehydration rate—i.e. white or black paper, paper toweling, waxed paper, aluminum foil.
3. Why do we dehydrate? Place fresh fruit slices and dried fruit slices in separate plastic bags and seal. Observe what happens.



XII. **Curriculum Coordinates**

Nutrition

1. Listing dried foods that can be used as a healthy snack.

Art

1. Drawing before and after pictures apple head dolls.

Language Arts

1. Student/class story describing the experiment.
2. Fiction—What would happen if everything we ate suddenly dehydrated?

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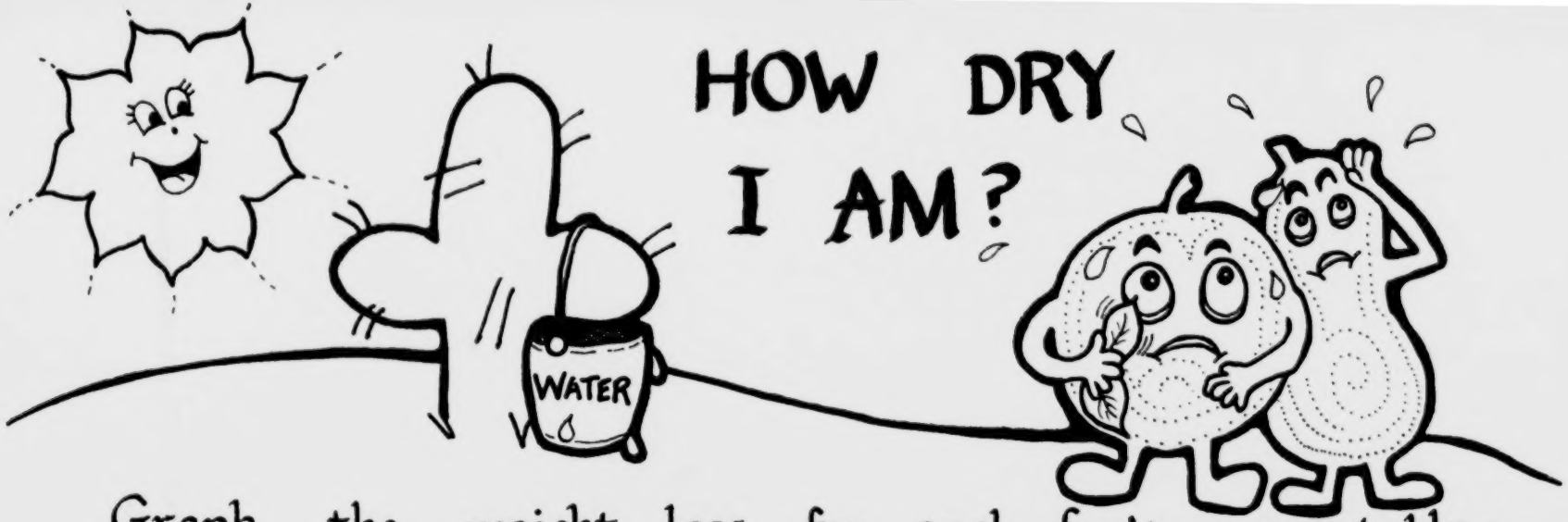
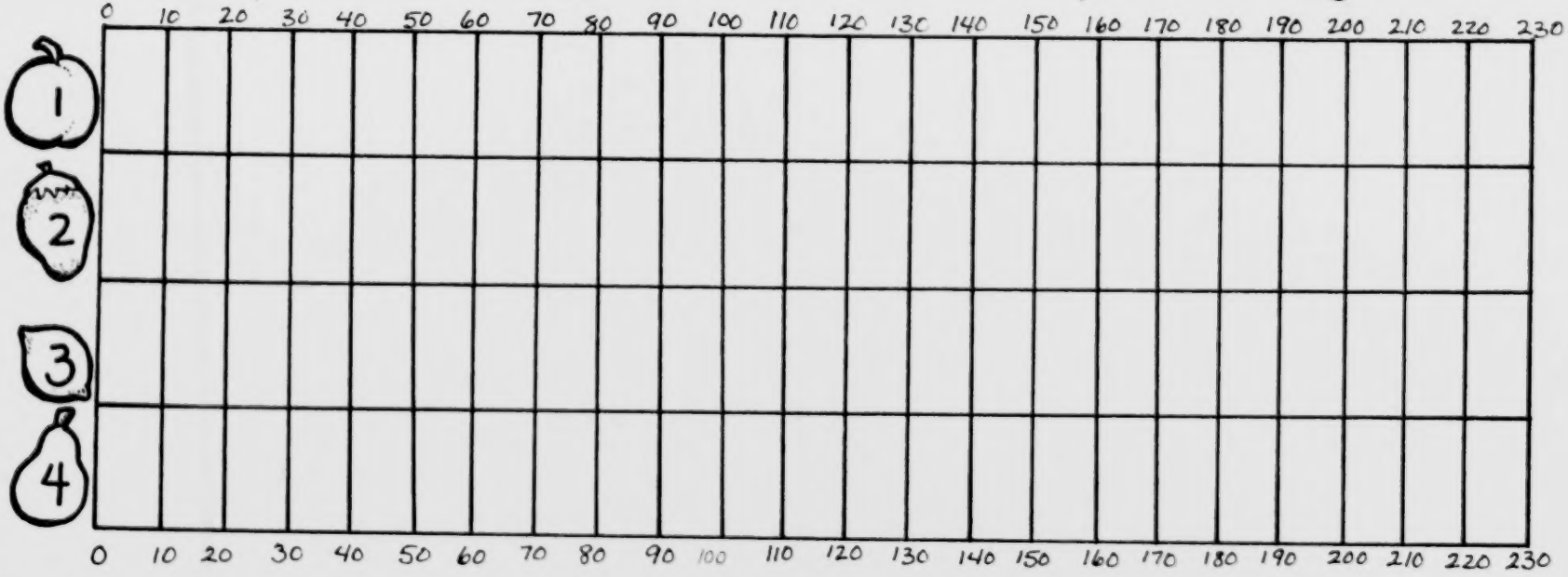
HOW DRY I AM?



Graph the weight loss for each fruit or vegetable~



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HOW DRY I AM?

1. Fruit/Vegetable _____
   - Original Weight ____ grams
   - Dehydrated Weight ____ grams
   - Weight Lost ____ grams

2. Fruit/Vegetable _____
   - Original Weight ____ grams
   - Dehydrated Weight ____ grams
   - Weight Lost ____ grams

3. Fruit/Vegetable _____
   - Original Weight ____ grams
   - Dehydrated Weight ____ grams
   - Weight Lost ____ grams

4. Fruit/Vegetable _____
   - Original Weight ____ grams
   - Dehydrated Weight ____ grams
   - Weight Lost ____ grams

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I. **Topic Area**

Counting Popcorn by tens and ones.

II. **Introductory Statement**

Students will learn how to count by tens and ones.

III. **Math Skills**

a. Whole number computation
b. Graphing
c. Estimating and predicting
d. Place value

Science Processes

a. Observing and classifying
b. Estimating
c. Gathering and recording data
d. Interpreting data

IV. **Materials**

Colored Popcorn—1 15.5 oz. jar
Teaspoon
For each child one square of each color for the graphing of their estimations
Popcorn shape—red, orange, yellow, green, blue for each child (see figure 3)
Glue stick
Baggies—1 for each child
2 class graphs (see figures 1 and 2)

V. **Key Question**

How much red popcorn is in this jar? Ask the same question for all of the colors.

VI. **Background Information**

There is approximately 1,000 popcorn kernels for each color in one jar of colored popcorn.

VII. **Management**

1. Divide this into 2 class periods.
   a. First Period use for the graphing of their estimations.
   b. Second Period use for the counting of the popcorn and the graphing of their actual counts.
2. Each period can take 30-45 minutes.
3. Before the lesson give each student a baggie with 1½ teaspoons of popcorn and 5 popcorn shapes for the recording of their count.
4. The teacher will need to do the total count. A little calculator works well.

VIII. **Procedure**

First Period

1. Let each child look at the jar of popcorn.
2. The students will take a red square and place it on the graph to show their estimations.
3. Do the same procedure for orange, yellow, green and blue.
4. Discuss the class graph.

Second Period

1. Give each child a baggie containing 1½ teaspoons of the colored popcorn and a popcorn shape for each color.
2. The students will group their popcorn into 5 colors.
3. The students will count one color at a time grouping in tens and ones.
4. They will record their answers onto the popcorn shapes.
5. The students will place the popcorn back into the baggies.
6. When the whole class has finished counting, the students will graph their answers doing one color at a time.
7. The teacher will count the total.
8. Discuss their estimations and the actual count.

X. **Discussion**

1. What was the difference between your estimations and the actual count?
2. Which color had the most popcorn?
3. Which color had the least amount of popcorn?

XI. **Extensions**

Let the students work in larger groups and count in hundred, tens and ones.

XII. **Curriculum Coordinates**

Language

1. Cut out a popcorn shape and let each child write what it's like to be popcorn popped in a popper.

Music

1. Popcorn, *We All Live Together*, Steve Millang and Greg Scelsa.

Art

1. Make a picture using the kernels.

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FIGURE 1

1,000 +					
1,000					
900					
800					
700					
600					
500					
400					
300					
200					
100					
	Red	Orange	Yellow	Green	Blue

FIGURE 2

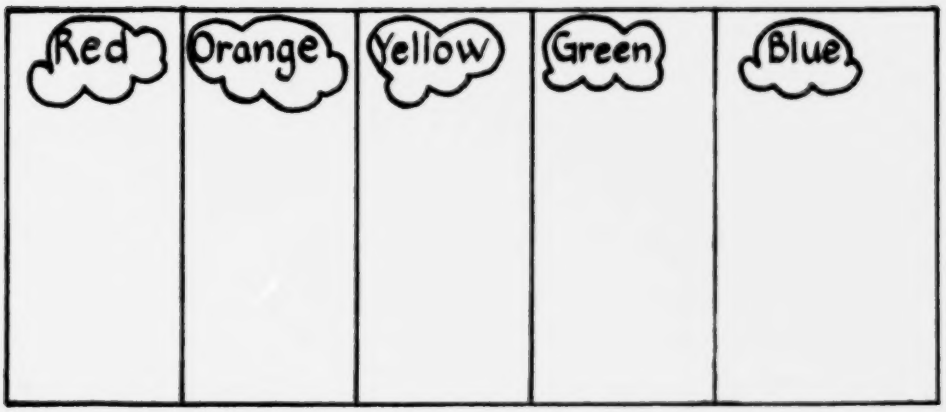
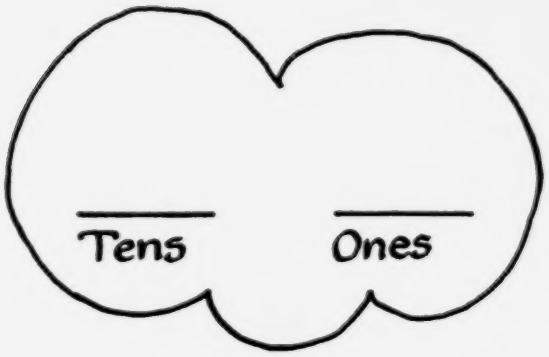


FIGURE 3



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I. **Topic Area**

Classification—different types of beans
Place value—making bean sticks

II. **Introductory Statement**

The students will classify types of beans. They will make bean sticks.

III. **Math Skills**

a. Counting
b. Weighing
c. Place value
d. Graphing

Science Processes

a. Classifying
b. Observing
c. Estimating
d. Recording data

IV. **Materials**

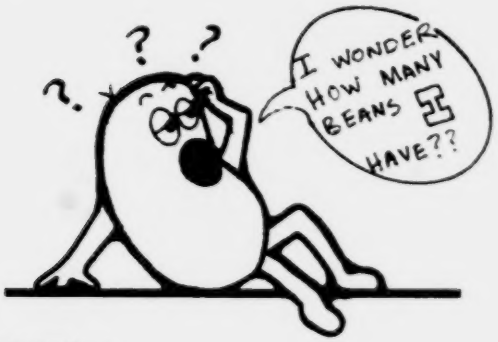
Dried beans—25 grams of several types (red, pink, navy, limas, white, black, mung)
Scales—kitchen or balance with weights
Tongue depressors or craft sticks
Glue—craft type works best
Student sheets
Large copy or transparency of student sheets

V. **Key Questions**

How can you group (classify) these beans?
How many of each kind of bean are in 25 grams?

VII. **Management**

This lesson will take at least one hour to complete as written. Each section can be taught separately as a part of the whole or on its own.



VIII. **Procedure**

Section 1

1. Display 25 grams of red or pink beans in a jar.
2. Allow the class to check the jar.
3. Students will estimate the number of beans in the jar and record their estimate on the student page.
4. Students/teacher will count the beans and record the amount on student worksheet.

Section 2

1. Divide the class into small groups (the same number as you have types of beans)
2. Give each group a handful of beans containing all of the bean types.
3. The group members will classify the beans in any manner the group decides.
4. The class will discuss the methods of classification used (size, colors, types, etc.)

Section 3

1. Each group will weigh 25 grams of one type of bean.
2. Students will estimate how many of each kind of bean are in 25 grams.
3. Students will record their estimates on the student sheet.
4. Discuss place value—i.e. it is easier to count in groups of ten.
5. Students will count the beans, gluing ten beans to each tongue depressor.
6. Record number of beans on student sheet and large copy or transparency of student sheet.
7. (optional) Students will fill in the graph showing how many beans for each type.
8. (optional) Students will fill in second student sheet using tens and ones or hundreds, tens, and ones.

X. **Discussion**

1. What are some ways things can be classified?
2. Can the size of objects help in estimating weight?
3. Will size always help?
4. How does counting by tens help when counting large numbers?

XI. **Extensions**

1. Students might use the bean sticks in future math lessons.
2. Students will classify other similar items.
3. Class could cook some of the beans.

XII. **Curriculum Coordinates**

Art

1. Bean Collages

Language Arts

1. Vocabulary development
2. Write experience stories

Social Studies

1. Where are beans grown?
2. What beans are used in what countries?

Nutrition

1. Placement of beans in the food groups.

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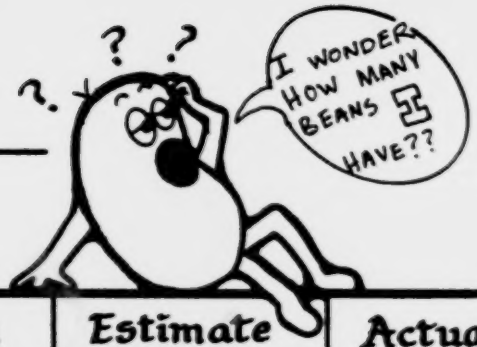
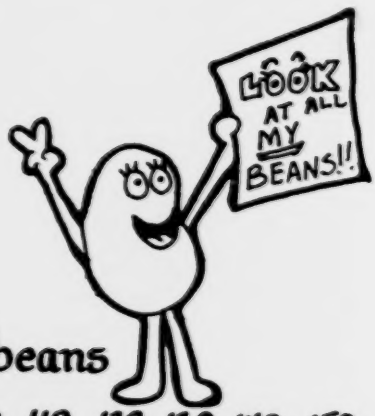
Name _____

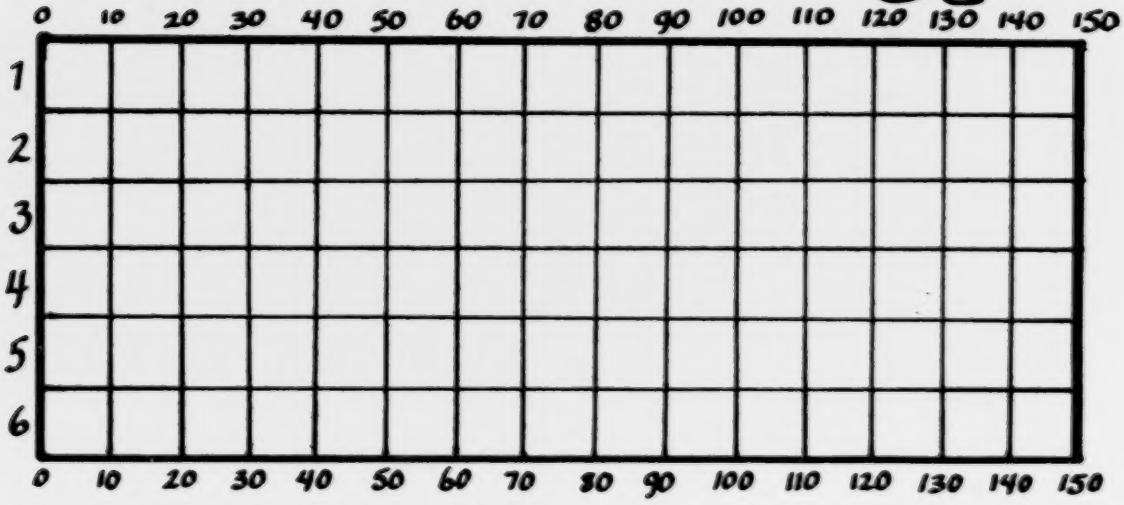


Beans!
BEANS!
BEANS!

Type of Bean	Estimate	Actual
1.		
2.		
3.		
4.		
5.		
6.		



Graph the number of beans



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Beans!
BEANS!
BEANS!

Name _____

Beans	Tens	Ones	Total

Beans	Tens	Ones	Total	=	Hundreds	Tens	Ones
				=			
				=			
				=			
				=			
				=			
				=			

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I. **Topic Area**
The Area of Leaves

II. **Introductory Statement**
Students will find the area of 4 different leaves.

III. **Math Skills**
a. Counting
b. Estimating and predicting

Science Processes
a. Measuring
b. Estimating
c. Gathering and recording data

IV. **Materials**
Leaves (at least 4 for each child)
Student worksheet (4 per child)
Crayons

V. **Key Question**
How can we measure the size of the leaf?

VII. **Management**
1. This activity takes 20-30 minutes.
2. This can be a whole class or small group activity.
3. Before the students count the squares stress very strongly that 3 corners must be within the outline of the leaf.
4. Make sure you and your class have decided on an uniform method of identifying whether a square can be counted.

VIII. **Procedure**
1. The children will take one leaf and outline it on the worksheet.
2. Using any color of crayon the students will estimate the area and record it on the ditto.
3. The children will count the squares of the leaf.
4. Record their answers.
5. Do the same procedure for the remainder of the leaves.
6. If the area sizes are appropriate do subtraction with the estimation and actual count.

X. **Discussion**
1. Were your estimations close to the actual count?
2. What was your smallest area?
3. What was your biggest area?

XI. **Extensions**
1. Measuring the length and width of leaves.
2. Find the area of leaves using square centimeter paper.
3. Have the students cut out their leaves. They will place their leaves on a class graph.

XII. **Curriculum Coordinates**
See "Don't Leaf Me Alone"

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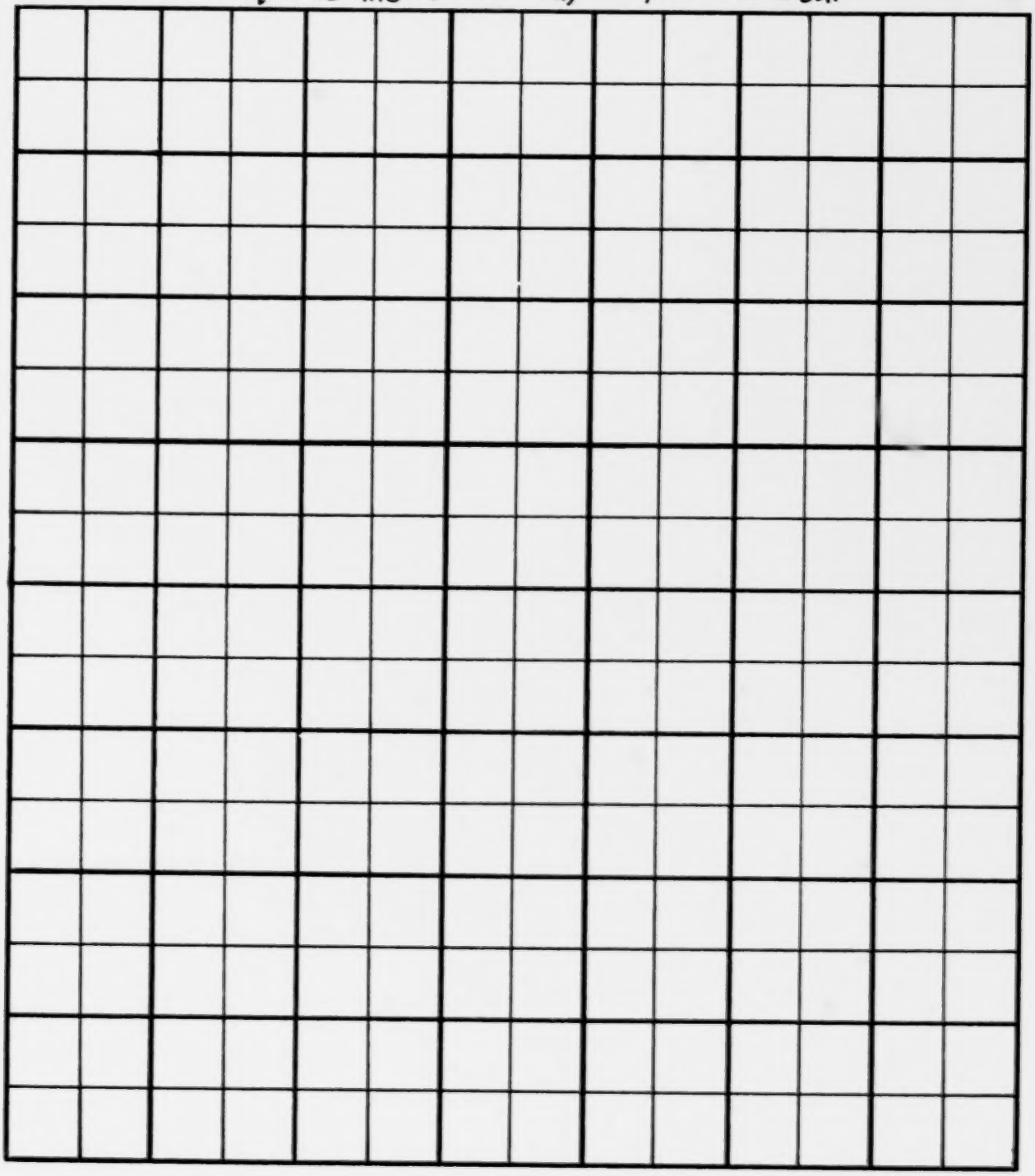
Name:

LEAF ME ALONE

1. Place the leaf on top of the graph.
2. Trace the leaf.
3. Count the squares inside the leaf to find the area.



_____ Estimate

_____ Actual

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I. **Topic Area**
Classifying Leaves

II. **Introductory Statement**
Students will learn how to group leaves.

III. **Math Skills**
a. Whole number computation
b. Graphing

Science Processes
a. Observing and classifying
b. Gathering and recording data
c. Applying and generalizing

IV. **Materials**
Leaves (at least 10 for each child)
Glue
Long paper (18 by 24) divided into 3 parts (a, b, c)—one per child
Student worksheet
Class graph
Squares for the graphing

a	b	c

Student Workpaper

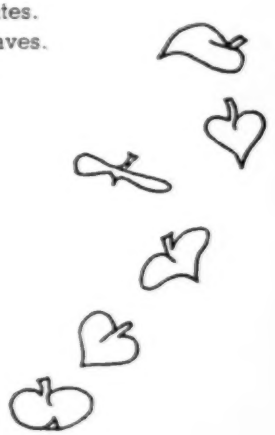
V. **Key Questions**
How are leaves alike?
How are leaves different?
What shape are the leaves?
What type of edge do they have?

VI. **Background Information**
Leaves are classified according to size, shape and edges. Size can be determined by measurement as in Leaf Me Alone. Common shapes include elongated, heart shape and lobed. Leaves can have either smooth or sawed edges. For more information refer to an encyclopedia.

VII. **Management**
1. Let the children bring the leaves to school.
2. This activity should be divided into 2 parts.

Part I
1. This takes 45-60 minutes.
2. Divide the children into groups of four.
3. In each group of four place a box of a variety of leaves.
4. Let each child pick 10 leaves.

Part II
1. This takes 20-30 minutes.
2. Class graph of the leaves.
3. Student worksheet.



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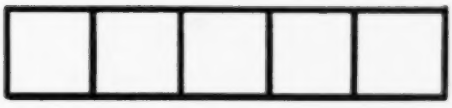
VIII. **Procedure**

Part I

1. Discuss how leaves are similar and different.
2. Let each child pick 10 leaves.
3. Let them decide which leaves should be grouped together and place them on their paper in three different groups. They should have at least 2 in a group and all the leaves do not need to be used.
4. Glue leaves onto the paper.
5. They will write a sentence or a title to describe the similarities in each group.

Part II

1. Discuss with the class about the types of groups they made.
2. Using their information make a class graph with five categories. List your class' categories on the graph.



Class Graph

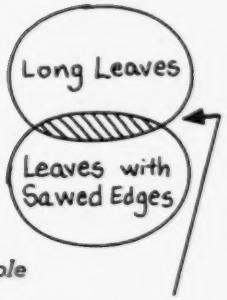
3. Let each child place a square on the graph for each type of group they have.
4. Complete the student worksheet.

X. **Discussion**

1. How were your leaves alike?
2. Which group had the most leaves?
3. What is your favorite type of leaf?

XI. **Extensions**

1. After completing the class graph of leaves, use yarn to make Venn diagrams. Place the yarn in circles on the floor. Label each circle. Each child will place a leaf in the Venn diagram.



example

Leaves that are both long and have sawed edges

2. Measuring leaves.
3. Using a microscope to look at the leaves.
4. Arranging them according to size—smallest to the largest.

XII. **Curriculum Coordinates**

Creative Writing

1. If I were a leaf...

Art

1. Leaf rubbings
2. Leaf printing
3. Making a picture using leaves
4. Make a notebook of leaves
5. Put colored leaves on a can or ice cream carton and cover with contact paper. Use for Christmas gifts.

Music

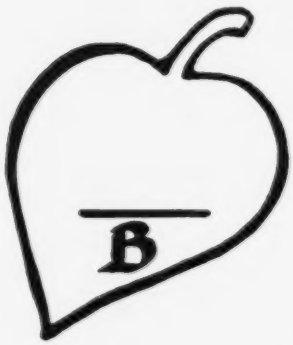
1. Three Maple Trees
2. The Little Tree
3. Silver Burdett Music Series

LEAF ME ALONE

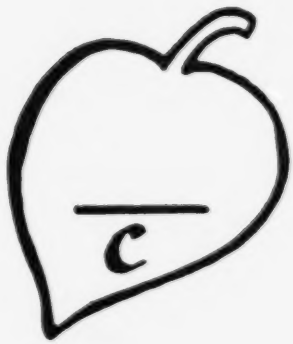
Name:

1. Total number of leaves in Group A.

2. Total number of leaves in Group B



3. Total number of leaves in Group C



4. A+B=____ A+C=____ B+C=____

A+B+C=_____

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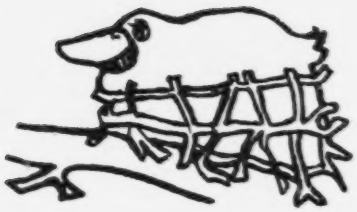
FOR THE BIRDS



I. **Topic Area**
Animal Home—Bird's Nest

II. **Introductory Statement**
Students will dismantle a bird's nest to discover what its contents are.

III. **Math Skills**
a. Counting
b. Measuring

Science Processes
a. Recording data
b. Observing
c. Comparison
d. Classification

IV. **Materials**
Bird's nest
Ruler
Paper towels
Student page
Pencil
Chalk board
Book, clipboard, or flat Surface

V. **Key Question**
What does a bird use when building a nest?

VII. **Management**
1. This activity takes at least 1 hour.
2. Use four or five small groups.
3. Encourage children *not* to bother a nest when a family of birds is living in it. Look for a nest in the fall or winter when it is empty.

VIII. **Procedure**
1. A student will measure the height of the nest and all students will reccord on student work sheet.
2. A student will measure the width of the nest and all students will record on student work sheet.
3. Give each group a portion of the nest.
4. The groups will take apart their portion of the nest.
5. The groups will classify and count the items—record their results.
6. The class will compile all results for a total for the nest.

X. **Discussion**
1. What are the things we found in this nest?
2. Would all nests be made of the same material?

XI. **Extensions**
1. Build a nest—use only things a bird would use.
2. Visit a bird sanctuary, or the zoo if there is one in your area.
3. Weigh the nest.
4. Measure the distance from the tree to the ground.
5. Study of Bird's Nest, their likenesses and differences.

XII. **Curriculum Coordinates**
Language Arts
1. Write a story on how a bird builds a nest.
Music
1. Sing a Song of Six Pence
2. Kookaburra Sits on the Old Gum Tree
Physical Education
1. Pretend you are a bird and practice Taking Off, Landing, and Flying.
Social Studies
1. Map study, finding countries where birds come from.
Art
1. Invent a bird, and a nest and draw it, or create it out of materials at hand.

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FOR THE BIRDS

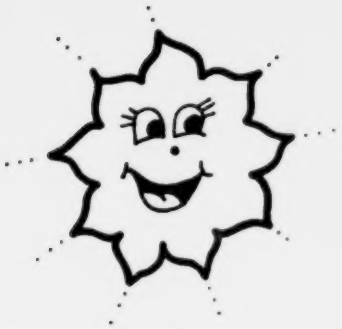
The nest is _____ inches high.

The nest is _____ inches wide.

Was anything unusual found in the nest? _____

_____

Nest-Building Materials	Number for Your Group	Total Number for Nest
Grasses or Weeds		
Shorter than 4 inches	_____	_____
Between 4 and 8 inches	_____	_____
Longer than 8 inches	_____	_____
Strings		
Shorter than 6 inches	_____	_____
Longer than 6 inches	_____	_____
Dirt or Sand	_____	_____
Feathers	_____	_____



Weather or Not

I. **Topic Area**
Weather

II. **Introductory Statement**
Students will become aware of the different types of weather and how it changes daily.

III. **Math Skills**
a. Graphing (calendar and bar graph
b. Counting
c. Estimating and predicting

Science Processes
a. Observation
b. Recording data
c. Interpreting data
d. Applying and generalizing

IV. **Materials**
Calendar ditto
Graphing ditto
Crayons
Pencils

V. **Key Question**
Is the weather always the same? How does it differ?

VIII. **Procedure**
1. To start this lesson, discuss what the weather is like outside. Then ask if it is always like this. How does it differ? Discuss the different types of weather we have.
2. Have students draw a picture of each type of weather for their area on the student's sheets, labeling each picture.
3. Pass out the student's weather calendars. Discuss the use of a legend. As a class, decide what types of weather you will need in the legend for that month. Have the students draw the pictures for these types of weather in the legend and label them.
4. Explain the procedure for charting daily weather.
5. Give your students their prediction graph. Discuss what type of weather your area might have during this season. The students will predict the number of days of each type of weather they expect during the month. Students will record their predictions on their worksheets.
6. At the end of the month, make a new graph with accurate data and compare to their estimates.

X. **Discussion**
1. Discuss different types of weather.
2. Discuss how certain kinds of weather can be helpful or harmful to us.
3. Discuss the different types of weather for the different seasons.

XI. **Extensions**
1. Make weather equipment, i.e. rain gauge, weather vane or barometer.
2. Chart the rainfall in your area with inches of precipitation, comparing with past seasons and with other areas.
3. Study solar energy, wind power and hydropower.

XII. **Curriculum Coordinates**

Art
1. Paint pictures of different seasons and weather.
2. Blow art (wind)
3. Sun prints

Language Arts
1. Poetry with weather theme
2. Creative writing
3. Stories dealing with weather
   a. Sylvester and the Magic Pebble
   b. Phantom Toll Booth

Music
1. Songs
   a. Raindrops Keep Fallling On My Head
   b. You Are My Sunshine
   c. Zipity Doo Daa
   d. Noah
   e. Beethoven #6
2. Make wind harp or wind chimes

Social Studies
1. Energy and Weather
2. Weather in different countries.
3. Seasons in different parts of the world, i.e. Northern and Southern Hemispheres.
4. Different types of clothing for different weather.

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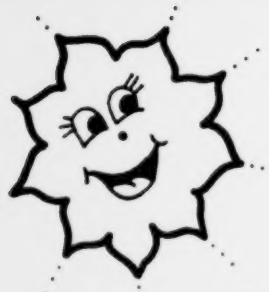
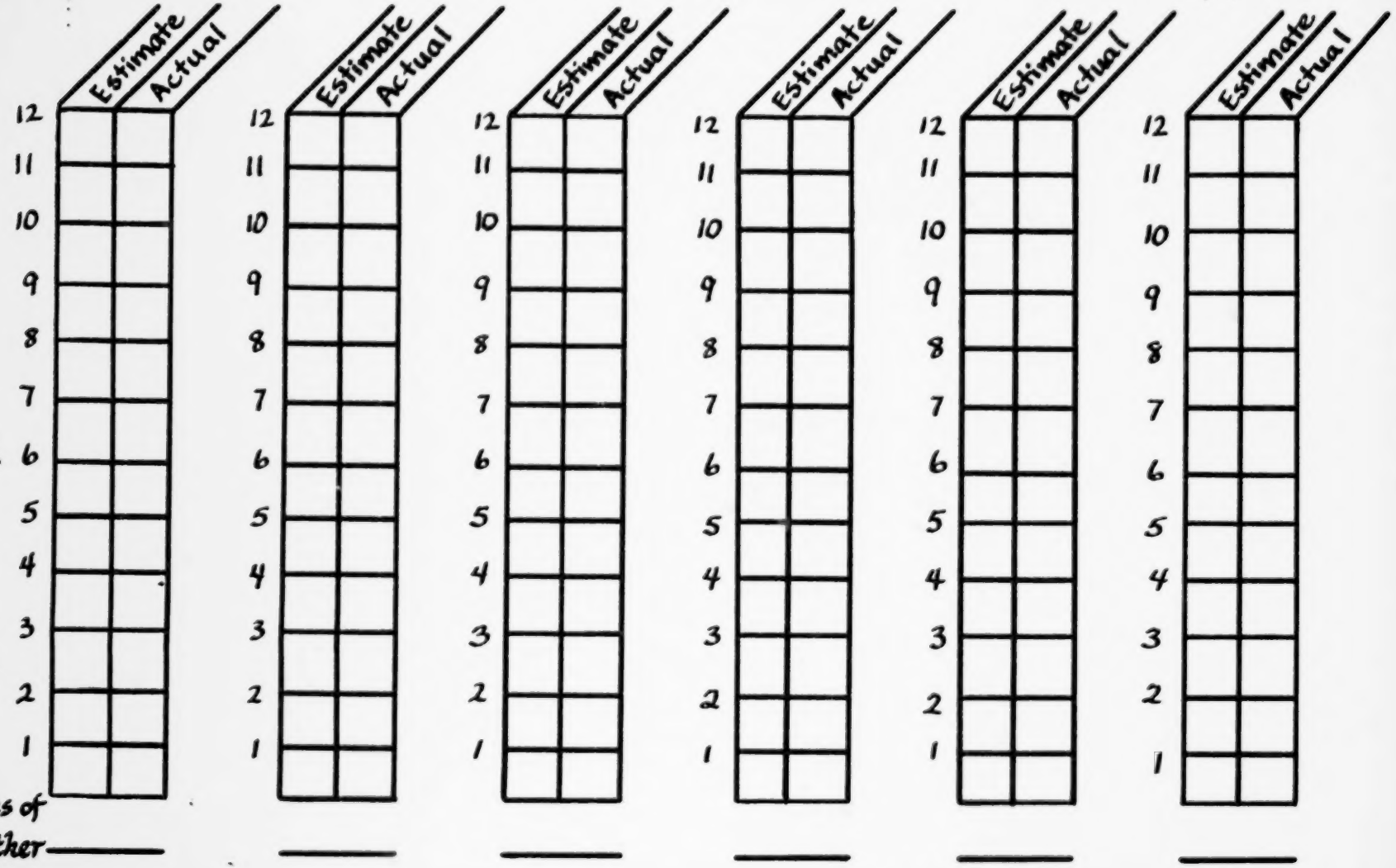


Weather or Not



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Weather or Not

_____

Legend

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

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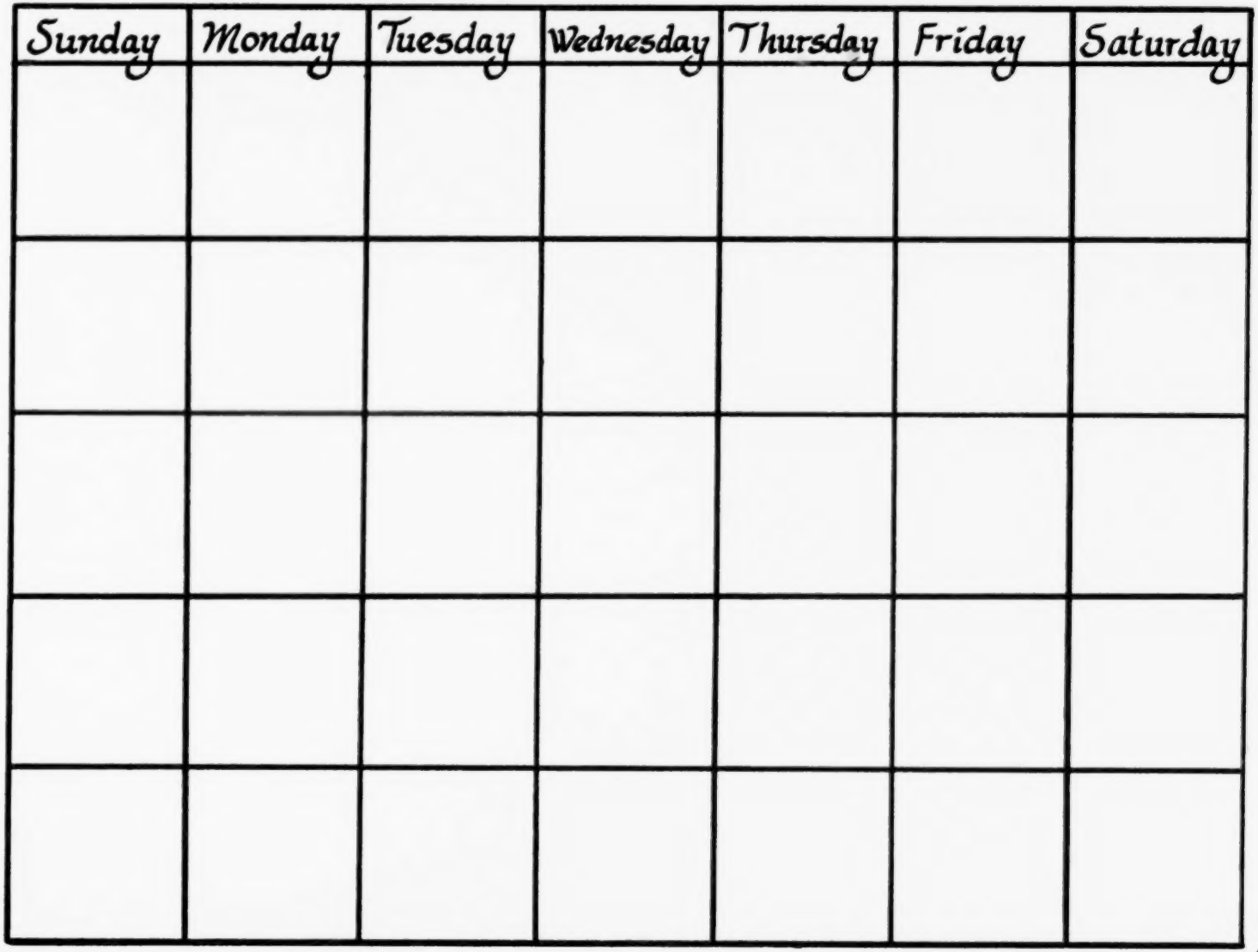

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Temperature's Rising

I. **Topic Area**
Measuring and Graphing the Temperature

II. **Introductory Statement**
Students will learn how to read a thermometer and graph the daily temperature.

III. **Math Skills**
a. Graphing
b. Estimating and predicting
c. Measuring temperature

Science Processes
a. Measuring
b. Estimating
c. Gathering and recording data
d. Interpreting data
e. Applying and generalizing

IV. **Materials**
Thermometer
Worksheet for each child
Crayons
Enlarged class graph—the same as the students

V. **Key Question**
How can we tell how cold or hot it is outside?

VII. **Management**
1. Use a class graph as an example.
2. Do this activity the first thing in the morning and again in the afternoon.
3. This activity takes 5-10 minutes every day for a week.

VIII. **Procedure**
1. The students will fold their student worksheet in half.
2. Using any color of crayon the students will estimate the morning and afternoon temperatures for the day.
3. The teacher or a student will read the correct temperature.
4. Using a different color of crayon the students will graph the actual temperature.
5. Do the same procedure for the afternoon.
6. Continue this for one or two weeks.

X. **Discussion**
1. When was it the coldest?
2. When was it the hottest?
3. Did your estimation get better by the end of the week?
4. How do we use thermometers in other ways in our life?

XI. **Extensions**
1. Hourly readings
2. Finding the difference of estimations and the actual readings.
3. Take the temperature in the shade and in the sun.
4. Visit a weather station.
5. Guest speaker from a local weather station.

XII. **Curriculum Coordinates**
Art
1. Cut out or draw pictures of clothes you wear when it's hot and cold.

Language
1. Experience stories
2. I would always live where it's _____ because _____.

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Temperature's Rising....

NAME:

These thermometers show the degrees Fahrenheit

Monday	Tuesday	Wednesday	Thursday	Friday
? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A

Mon.	Tues.	Wed.	Thurs.	Fri.
? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A	? 100 90 80 70 60 50 40 30 20 10 0 A

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Temperatures Rising

NAME:

These thermometers show the degrees Celcius

Monday	Tuesday	Wednesday	Thursday	Friday
50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A

Mon.	Tues.	Wed.	Thurs.	Fri.
50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A	50 40 30 20 10 0 -10 -20 ? A

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Color My World

I. **Topic Area**
Color

II. **Introductory Statement**
Students will experiment with colors and discover which colors are created when the primary colors are mixed together.

III. **Math Skills**
a. Measuring
b. Predicting
c. Venn diagrams

Science Processes
a. Observing and classifying
b. Gathering and recording data
c. Applying and generalizing

IV. **Materials**
two cans of white frosting or three cups of homemade frosting
red, yellow, and blue food coloring
three mixing bowls (12 oz.)
3 ½ teaspoons
1 large box of graham crackers
1 cup measuring cup
1 small knife or spatula
napkins
crayons

V. **Key Questions**
1. What color can be made by combining red and blue?
2. What color can be made by combining blue and yellow?
3. What color can be made by combining red and yellow?

VI. **Background Information**
Red, yellow and blue are called primary colors. Every other color can be produced by mixing different combinations of these colors.
Red and Yellow make orange
Red and Blue make purple
Yellow and Blue make green
The newly created colors are orange, purple and green. These colors are called secondary colors.

VII. **Management**
1. This activity takes 30 to 45 minutes.
2. The teacher should color and mix frosting beforehand: 1 cup red; 1 cup yellow; 1 cup blue.
3. This investigation can be done in small groups or with the entire class.
4. Three worksheets have been provided for this activity. The first worksheet has the three primary colors labeled. This is the worksheet used in the procedure. The second two worksheets provided are for use as testing tools or extension activities.

VIII. **Procedure**
1. Hand out student worksheet and discuss together.
2. Each student will be given one graham cracker.
3. Each student will measure ½ teaspoon of each color of frosting and place on the graham cracker.
4. The students will predict what color will be made when red and blue are combined. The teacher may list the students' predictions on the board.
5. The students will mix red and blue frosting on their graham cracker using their finger as a paintbrush.
6. The students will record their findings with crayon on their worksheet.
7. The students will predict what color will be created when yellow and red are combined. The teacher may list the students' predictions on the board.
8. The students will mix yellow and red frosting on their graham cracker.
9. The students will record their findings with crayon on their worksheet.
10. The students will predict what color will be made when yellow and blue are mixed together. The teacher may list students' predictions on the board.
11. The students will mix yellow and blue frosting on the graham cracker.
12. The students will record findings on the student worksheet with crayon.

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X. **Discussion**

1. What would happen if the three primary colors were combined?
2. What are the newly created colors called?
3. What would happen if we mixed these colors together?

XI. **Extensions**

1. After the initial activity the students should be allowed to experiment on their own, changing the variable of color. Provide white frosting and food coloring for students to mix three colors of their choice. Then have them follow the procedure and repeat the investigation.
2. Using the provided master, the teacher may want to make three frames of tagboard, using red, yellow and blue cellophane in the cut-out center. For the yellow cellophane, you may want to try 2 or 3 additional layers to create the proper intensity of color. This provides an excellent visual presentation of the lesson. When the frames are put up to the window, the overlapping colors show a good example of mixing lights.
3. Explain that every color can have many variations. This can be done by having students experiment with water and different quantities of food coloring.

XII. **Curriculum Coordinates**

Literature

1. "The Magic Crayon" Tony Palazzo
2. "What Color Is Your World?" Bob Gill

Language Arts

1. Show a color. Write a description about how it makes you feel.

Music

1. "Colour My World"
2. "Over the Rainbow"
3. Have students make color-line pictures that express their responses to various types of music. Make a new picture for each excerpt played.

Art

1. Using primary and secondary colors, have students make fruit prints using apples, pears, carrots and celery.
2. Have students design personal stationery using primary and secondary colors. Some ideas may include: crayon prints; dot-spot designs; marbled paper.
3. Have students make a tissue paper collage.
4. Have students make an individual "color" book. Prepare a booklet with one color theme. Cut and staple construction paper together. (Size and number of pages should be left up to the teacher's discretion.) The student will collect samples of objects with different textures; but of similar color.

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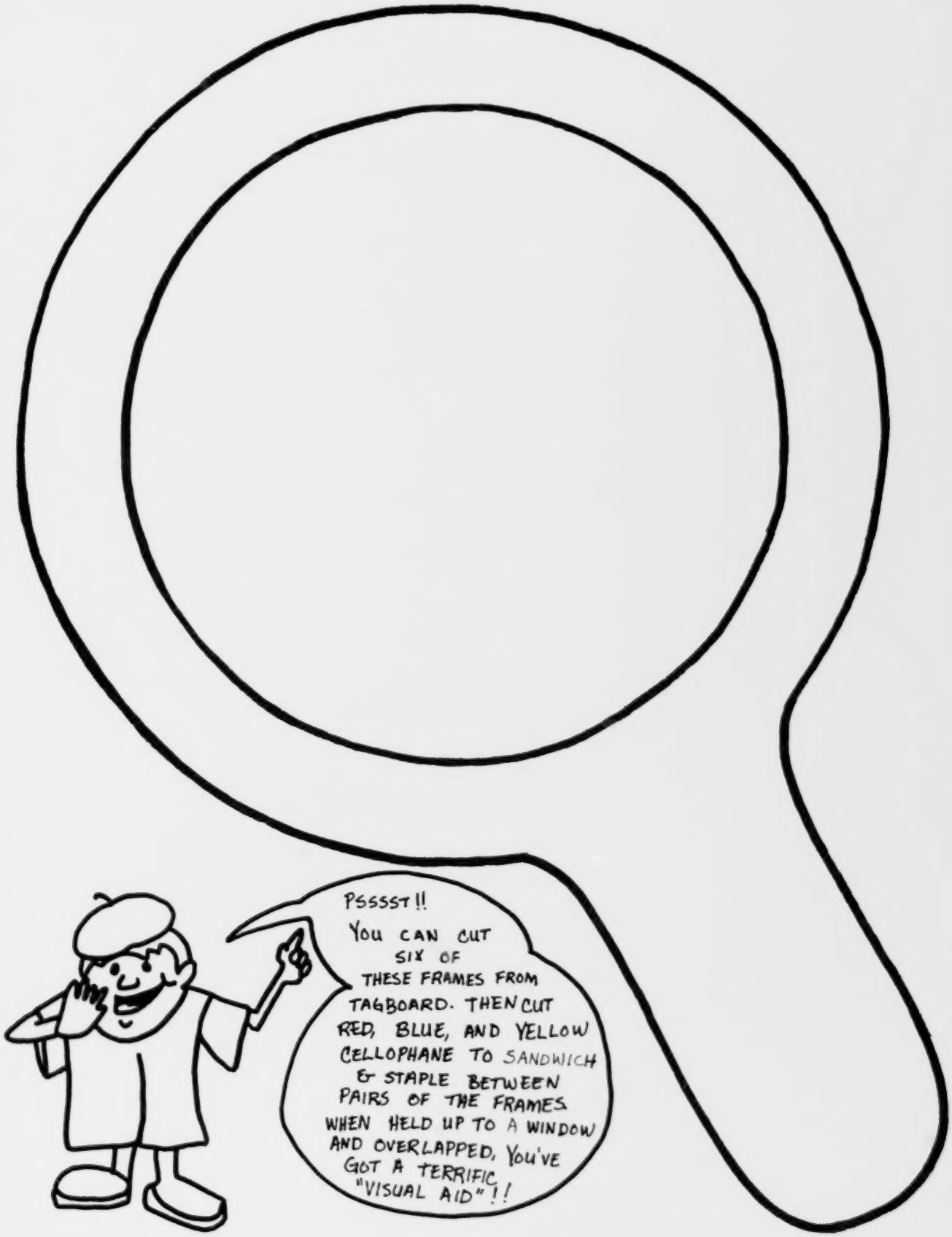
PSSSST!!
YOU CAN CUT SIX OF THESE FRAMES FROM TAGBOARD. THEN CUT RED, BLUE, AND YELLOW CELLOPHANE TO SANDWICH & STAPLE BETWEEN PAIRS OF THE FRAMES. WHEN HELD UP TO A WINDOW AND OVERLAPPED, YOU'VE GOT A TERRIFIC "VISUAL AID"!!

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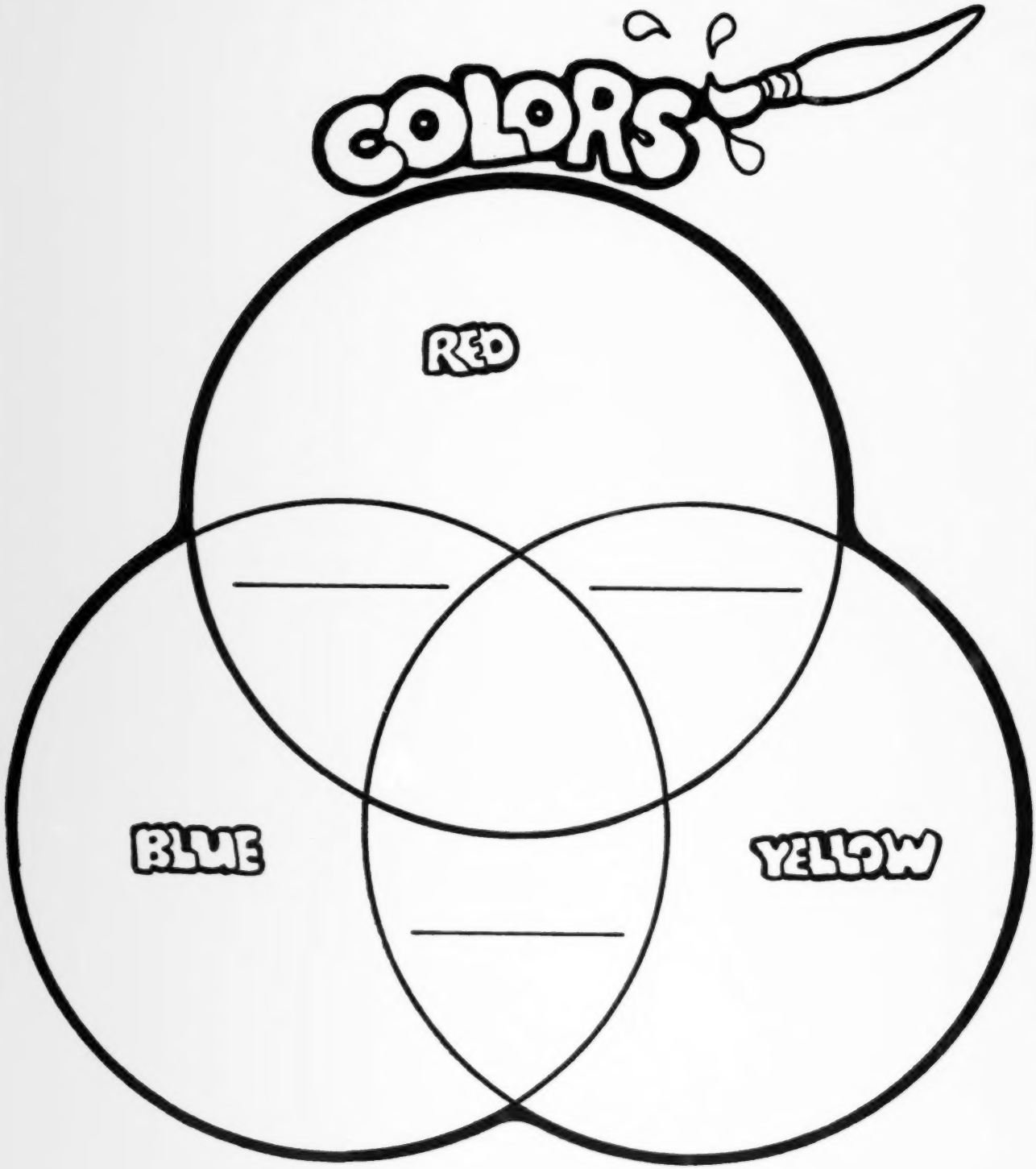

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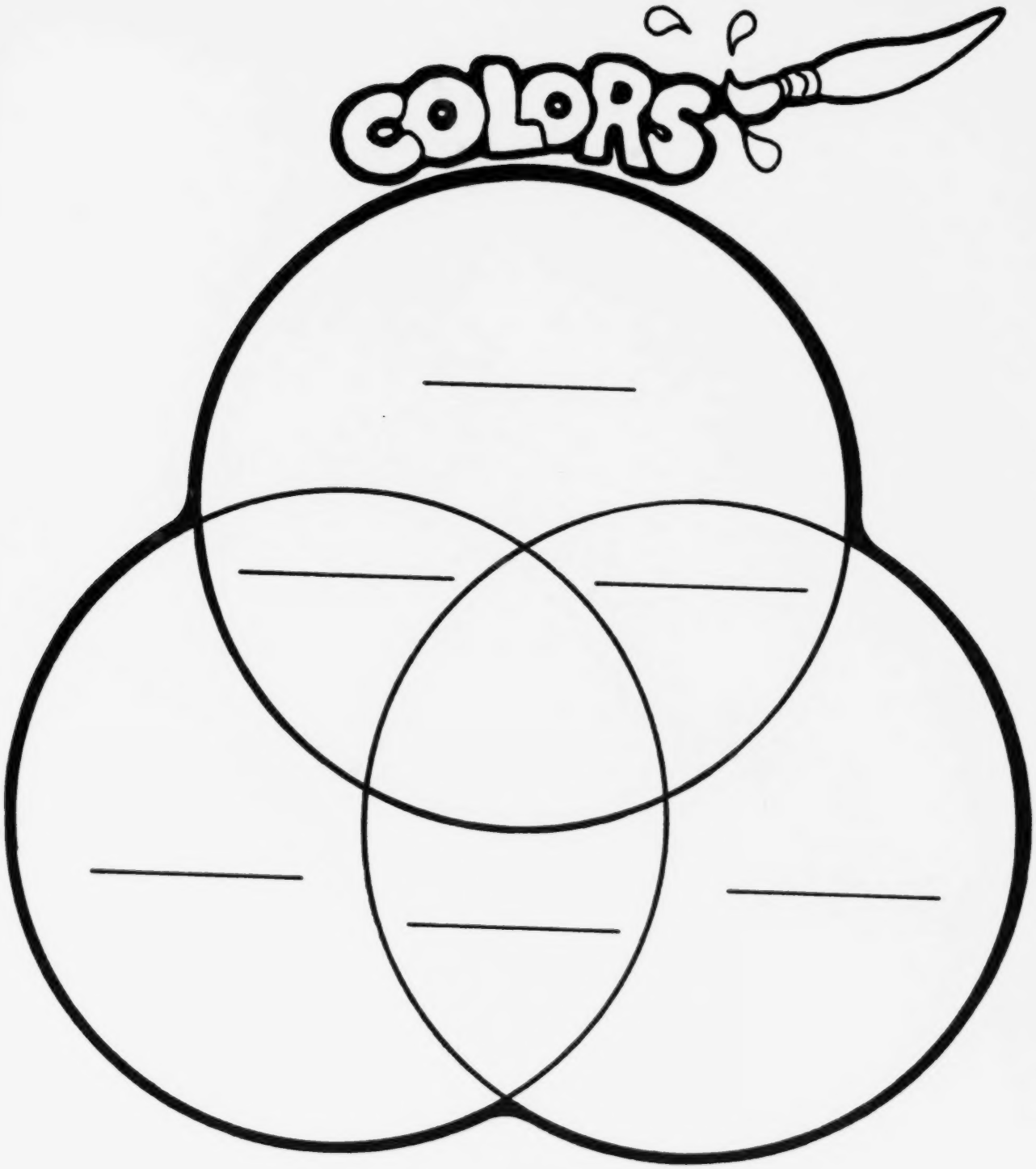

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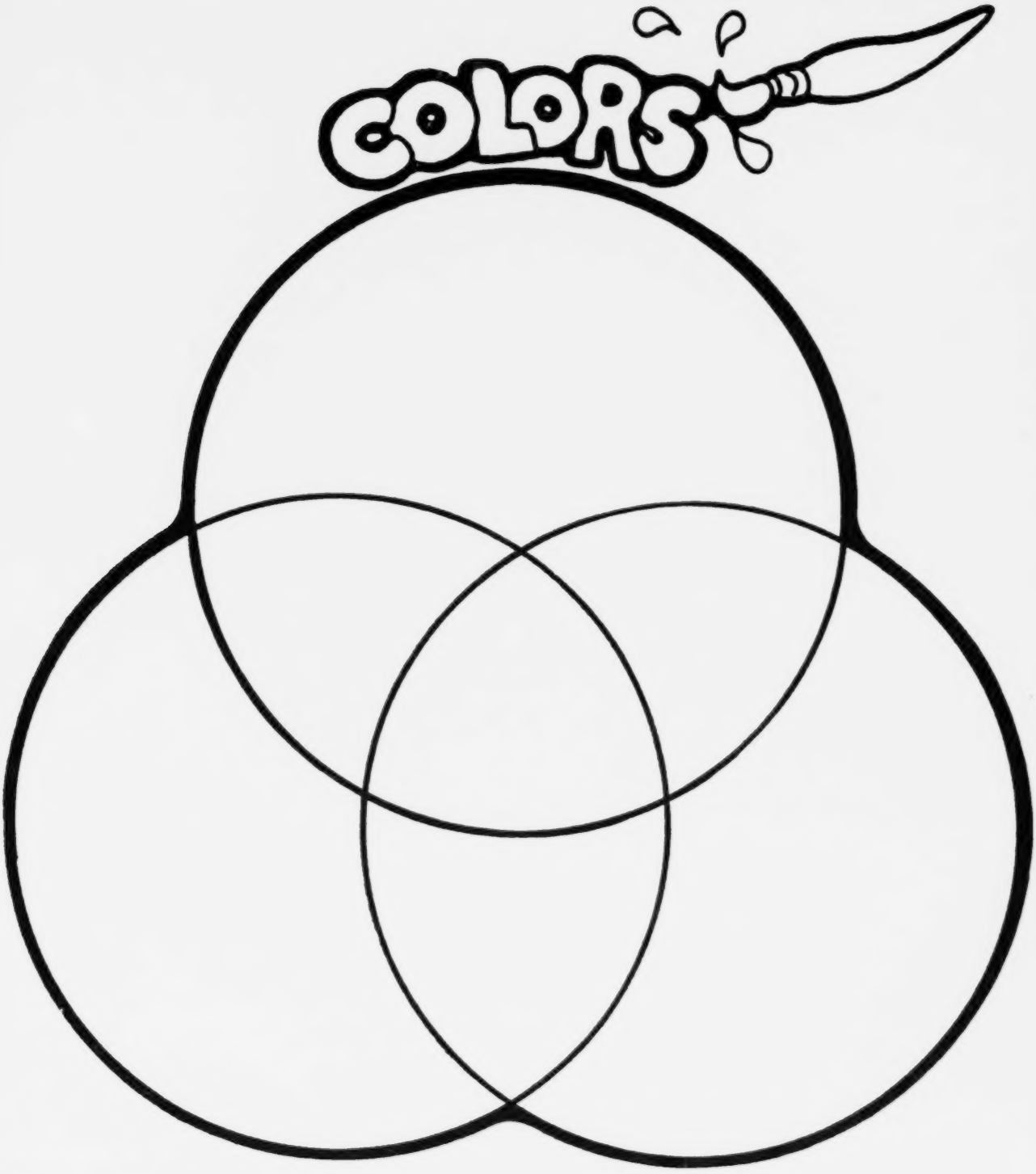

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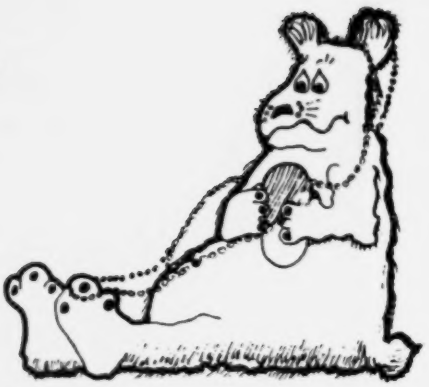
"DISC"OVER COLOR



I. **Topic Area**
Color

II. **Introductory Statement**
Students will discover pairs of colors that are complimentary.

III. **Math Skills**
a. Fractional numbers
b. Geometry—recognizing shapes
c. Classifying

Science Processes
a. Observing and classifying
b. Gathering and recording data

IV. **Materials**
one two inch cardboard circle for each student
one piece of 24 inch string for each student
tempra paint to include: red, yellow, bluish-green (approximately 1 part blue, 3 parts green)
any sharp object to poke holes into cardboard circles (large needle, nail, scissor tip)

V. **Key Question**
What two colors can you put on a disc so that when you spin the disc it appears near white?

VI. **Background Information**
Any two colors that, when spun together, produce white are called complimentary colors. The following pairs of colors are complimentary.

red and bluish-green
orange and greenish-blue
yellow and blue
green and purplish-red
violet and greenish-yellow

This investigation will be simplified by using only four colors. The possible color combinations in this activity are:

blue and red
blue and bluish-green
yellow and blue (complimentary)
red and bluish-green (complimentary)
red and yellow
bluish-green and yellow

VII. **Management**
1. This investigation is a natural followup to "Color My World." It is not necessary that "Color My World" is done before this activity is started.
2. This investigation takes at least three, thirty minute sessions. Additional time may be provided for the students to experiment and discover on their own.
3. It is important that the paint is dry before the students begin to spin the discs.
4. Crayons may be used instead of paint if the children are able to color dark. Paint will bring the best results.
5. Poking the string through the holes may pose a problem for the students and the teacher's assistance may be necessary.
6. Two buttons, one placed on each side of the disc may be used to stabilize the spinning. The string should be thread through two holes on the buttons as well as the disc.
7. Teachers may need to assist students if they have difficulty spinning their discs. In some cases, the teacher may want to do the spinning and have the students gather the data from observing.
8. The two colors when spun together will turn an "off-white" or "beige" not a true white.
9. The teacher needs to experiment on how to spin the disc before doing it with the entire class. The activity works best when the disc is spun at a consistent, quick rate of speed.

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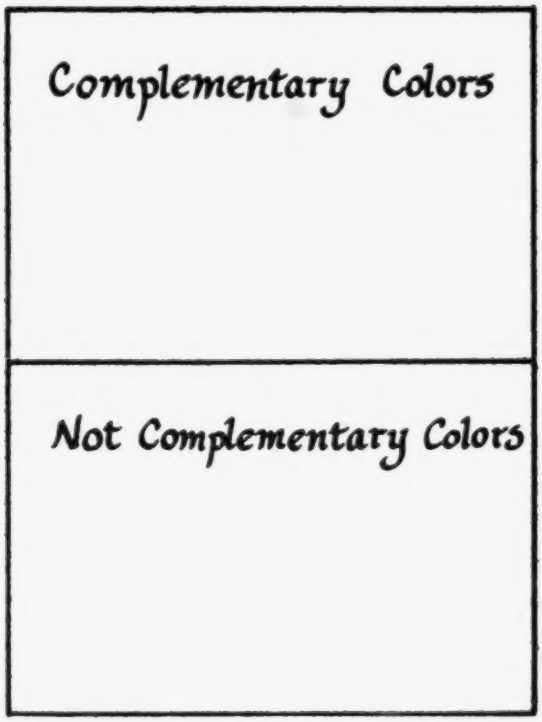
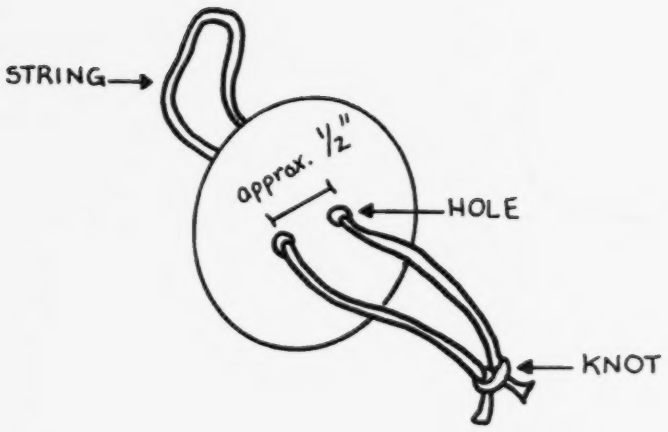
VIII. **Procedure**

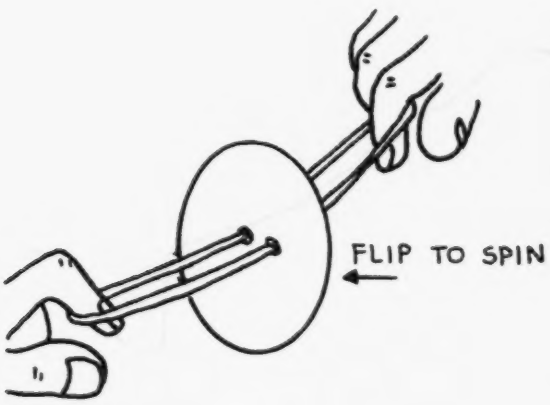
Before Class

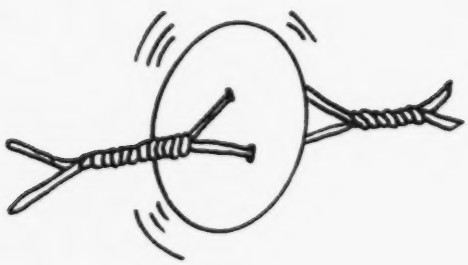
1. Prepare discs, cut string and gather paint and brushes.
2. The teacher will have to poke two holes in the center of the cardboard disc. These holes should be approximately ½ inch apart. These holes can be made with any sharp instrument. Refer to diagram.
3. Prepare class chart. Take a large piece of paper and divide it in half, labeling one part Complimentary Colors and the other part Not Complimentary Colors.



Class Chart







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With students

1. Each student will receive one small cardboard disc.
2. The student will draw a line to divide the disc in half.
3. The student will paint (color) one half of the disc a color of his/her choice out of the paints that have been provided by the teacher.
4. After the paint is dry, the students will paint the other half of the disc another color of his/her choice.
5. The student will put a piece of string 24 inches long through the holes that have already been poked by the teacher. The teacher at this time may want to secure the disc with a button on each side.
6. The student will tie a knot at the end of the string. The teacher may want to assist with this.
7. The student will spin the disc, by twisting the string, stretching it, and allowing it to unwind.
8. The student will observe the spinning disc and write the color the disc becomes on the back of the disc.
9. The student will record their results on student sheet.
10. With the teacher in a class discussion, the students will classify the color discs into those that are complimentary and those that are not. A class chart may be used to record data. The student will classify by coming up and gluing their disc in the appropriate place on the class chart.

X. **Discussion**

1. What colors when combined, make white?
2. If when the colors are combined and they do not make white, what colors do they make?

XI. **Extensions**

1. Allow students to try other combinations. They may use a student worksheet to record results.
2. What would happen if we divided the disc into thirds? Fourths?
3. What would happen if instead of a circle disc we used a triangle? Square?

XII. **Curriculum Coordinates**

Language

1. Call the children's attention to the color of their clothes and objects such as pens, pencils, chalk, crayon, and book covers. Discuss what color combinations are complimentary and which are not.

Art

1. Using a white sheet of 12" by 18" paper, and small pieces of chalk, have students choose their favorite complimentary combinations. Have students fill their paper with these chalk colors. Remind students to use the chalk on its flat side. Put three tablespoons of liquid starch on the center of the design, and use the palm of the hand to spread the starch over it. When the chalk has been covered, fold the paper in half lengthwise with the wet sides together. Then run the blunt end of a paintbrush heavily across and up and down the outside of the paper to channel the starch for an interesting effect. Unfold the paper and lay it flat to dry for about two hours. Use the designs as booklet cover or wall hanging.

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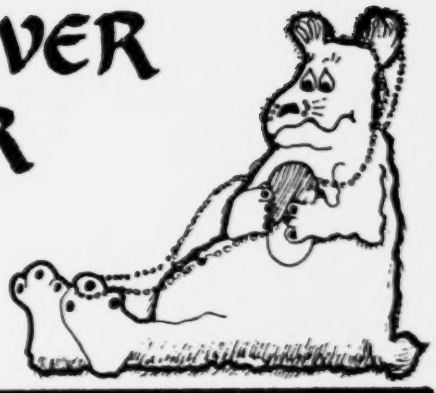
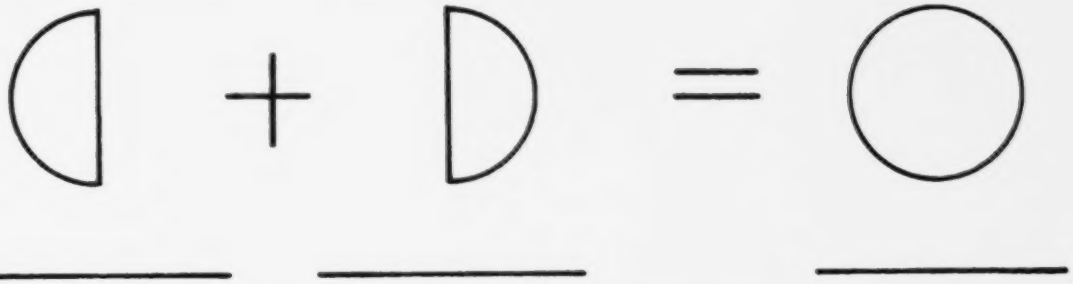
Name

"DISCOVER COLOR



Color ½ + Color ½ = Color when spun

Complementary Colors



Not Complementary Colors

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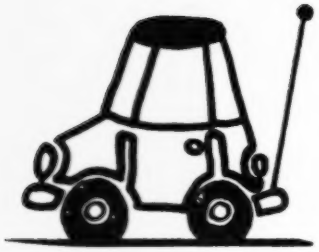

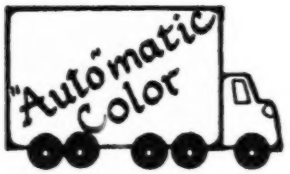

I. **Topic Area**
Color

II. **Introductory Statement**
Students will observe cars passing in front of them, and will gather and record data on a pie graph.

III. **Math Skills**
a. Whole number computation
b. Graphing
c. Estimating/predicting
d. Fractional numbers

Science Processes
a. Observing and classifying
b. Gathering and recording data
c. Applying and generalizing

IV. **Materials**
pencil
crayons (red, orange, yellow, green, blue, purple, pink, black, white, gray, and brown)
student worksheets
access to a street with cars passing by

V. **Key Question**
What color is the most popular?

VII. **Management**
1. This investigation takes approximately 30-45 minutes.
2. This activity may be done with the entire class or a small group.
3. Before the students go outside to observe, the teacher may want to review safety rules.
4. This investigation is designed for observing 24 cars. The teacher should feel free to alter this to meet his/her needs. The pie graph can be altered accordingly.
5. If an appropriate street is not available, the teacher may choose to use a nearby parking lot instead.
6. This investigation works the best when students work together in groups of two. One student should keep a tally of the exact number of cars that pass and the other student should keep a tally of the exact color of car that passes.

VIII. **Procedure**
1. Discuss the key question and student worksheet with the students.
2. Accompany the students outside and help them find a safe place to observe the passing cars.
3. Using the tally system the students record the color of each car that passes.
4. After the specified number of cars have passed, the students return to class.
5. Once the students have reviewed the data they collected, they will record it on individual graphs.
6. Have the class ask questions and determine answers about the graph. (There is an optional sheet provided for this step)
7. Then the students will make an individual pie graph. Directions are included on the worksheet.
8. Distribute the fractional pie graph overlay to the class.
9. The class will develop questions regarding estimation of fractional parts. For example, "Is there any color of car that made up one half of the total number of cars that passed by you?" "Is there any color of car that made up one fourth of the total number of cars that passed by you?" "Is there any color of car that made up one eighth of the total number of cars that passed by you?" Check to find if your predictions are accurate using the overlay worksheet.
10. To find the answer to these questions the students place the overlay directly over pie graph. They rotate the overlay until the appropriate fractional part is over the color being discussed. By observation, they will be able to verify their predictions.
11. The answers to these questions should be recorded on the student worksheet that compares the car color to the fractional part.

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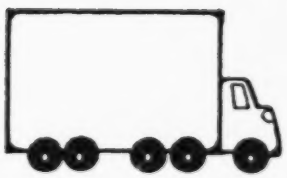
X. **Discussion**

1. Discuss what color of car was the most popular?
2. Have students develop their own math problems using the data they collected. For example, "How many more red cars are there than pink?" "How many orange and yellow cars together passed by you?" An additional student worksheet is included for this purpose.
3. Have students develop their own math problems using the data they collected. For example, "What color of car is greater than one half of all the cars that passed by you?" "What color of car is less than one half of all the cars that passed by you?" Other questions similar to these may be asked using other fractional parts. The provided overlay worksheet may be used to check your answers.
4. Have students develop their own math problems using the data they collected. For example, "What two colors when added together is greater than one half of the cars represented?" "What two colors when added together is less than one half of the cars represented?" Other questions similar to these may be asked using other fractional parts.

XI. **Extensions**

1. What would happen if we repeated this activity at a different time of the day?
2. What would happen if we repeated this activity at a different time of the year? How would the results differ?
3. Tally, record and graph the frequency of colors for other items. (e.g. eye color, favorite color, clothing color)



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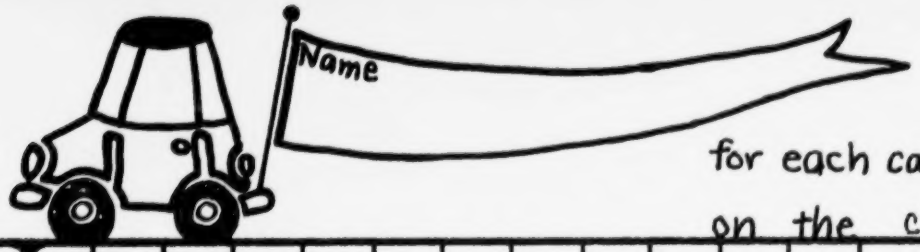
"Automatic" Color	What Colors Do You See Passing?
red	
orange	
yellow	
green	
blue	
purple	
pink	
black	
white	
gray	
brown	
other	



Color one square for each car that matches a color on the chart.

red																				
orange																				
yellow																				
green																				
blue																				
purple																				
pink																				
black																				
white																				
gray																				
brown																				
other																				
"Auto"matic Color	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

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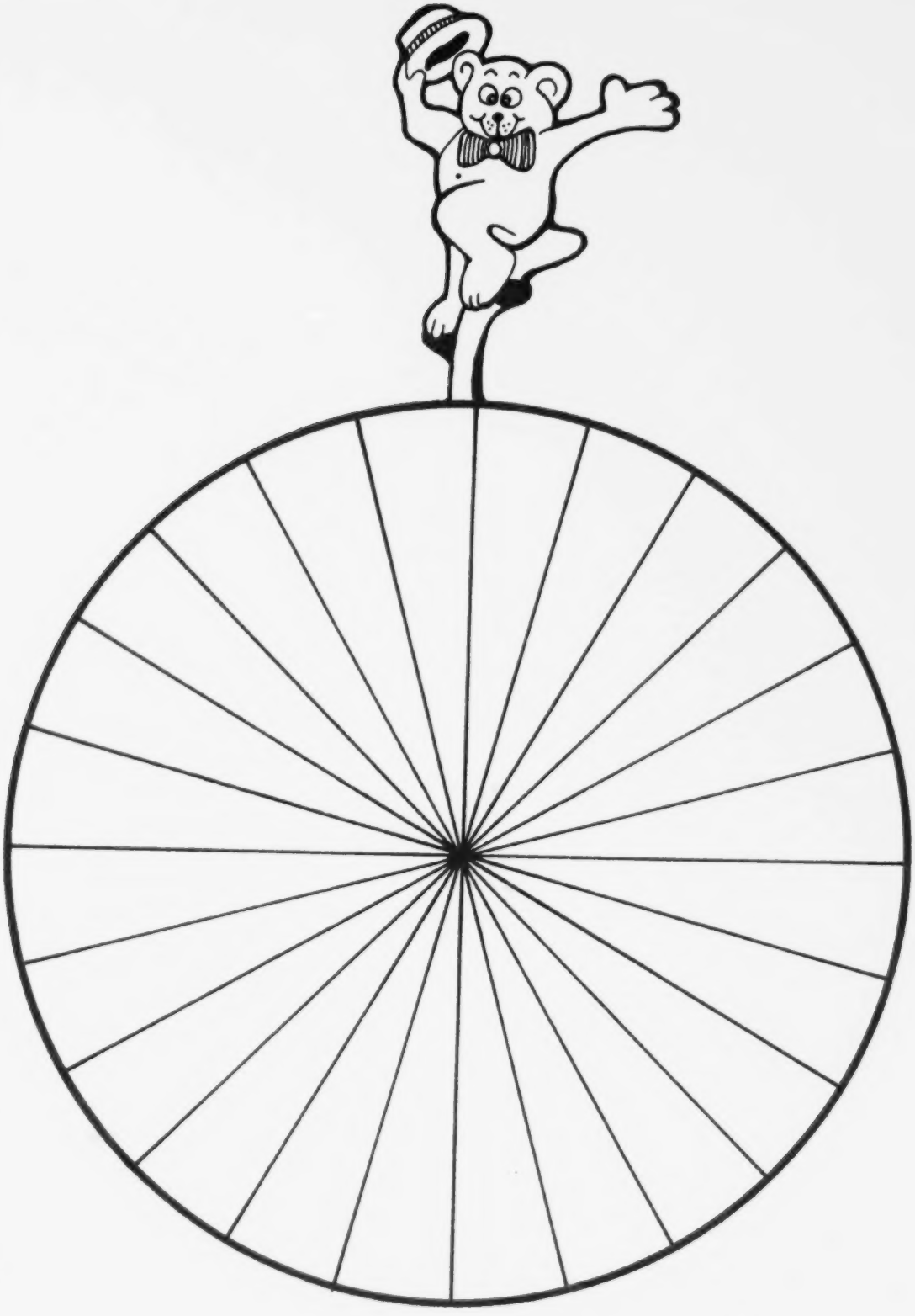

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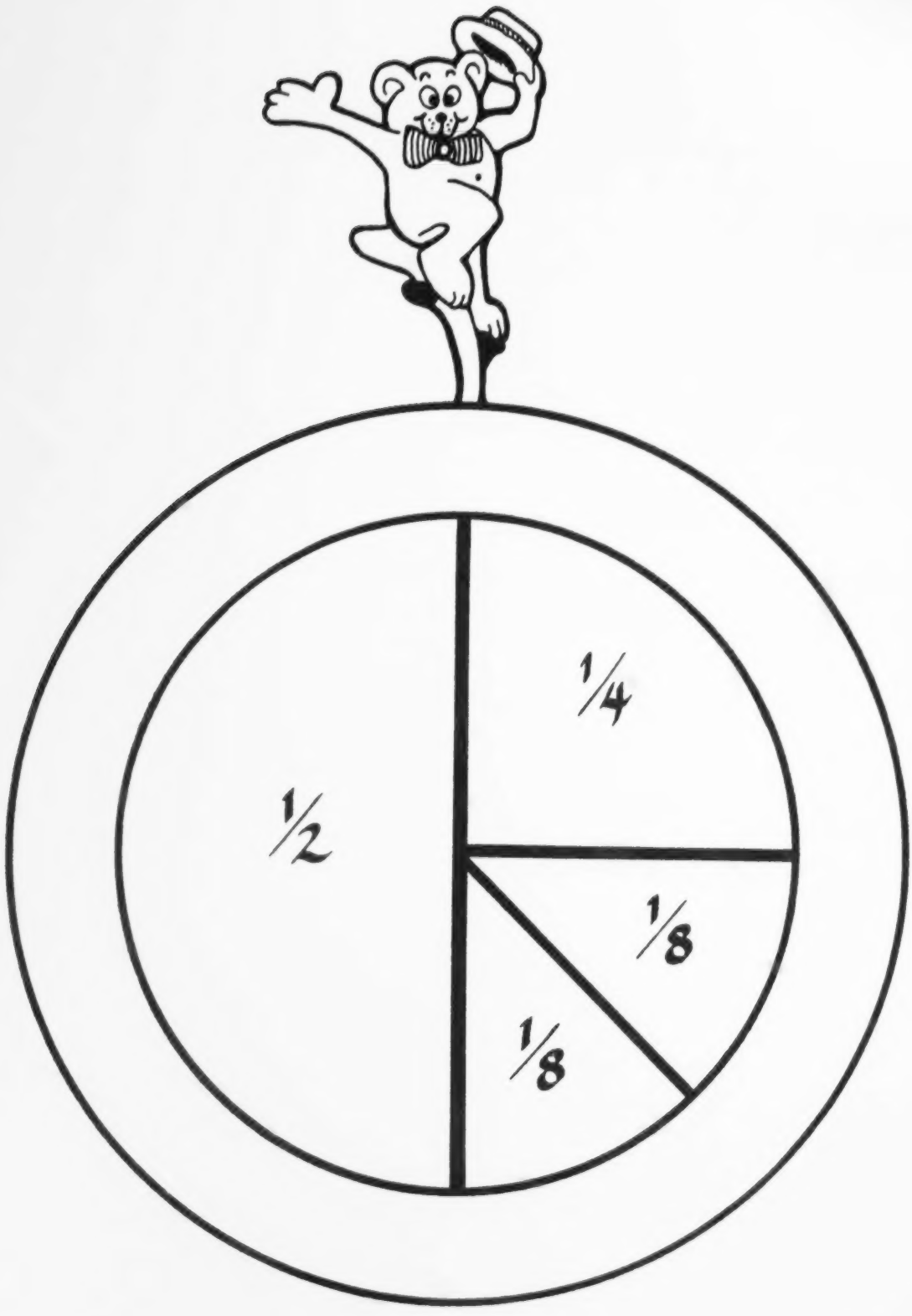

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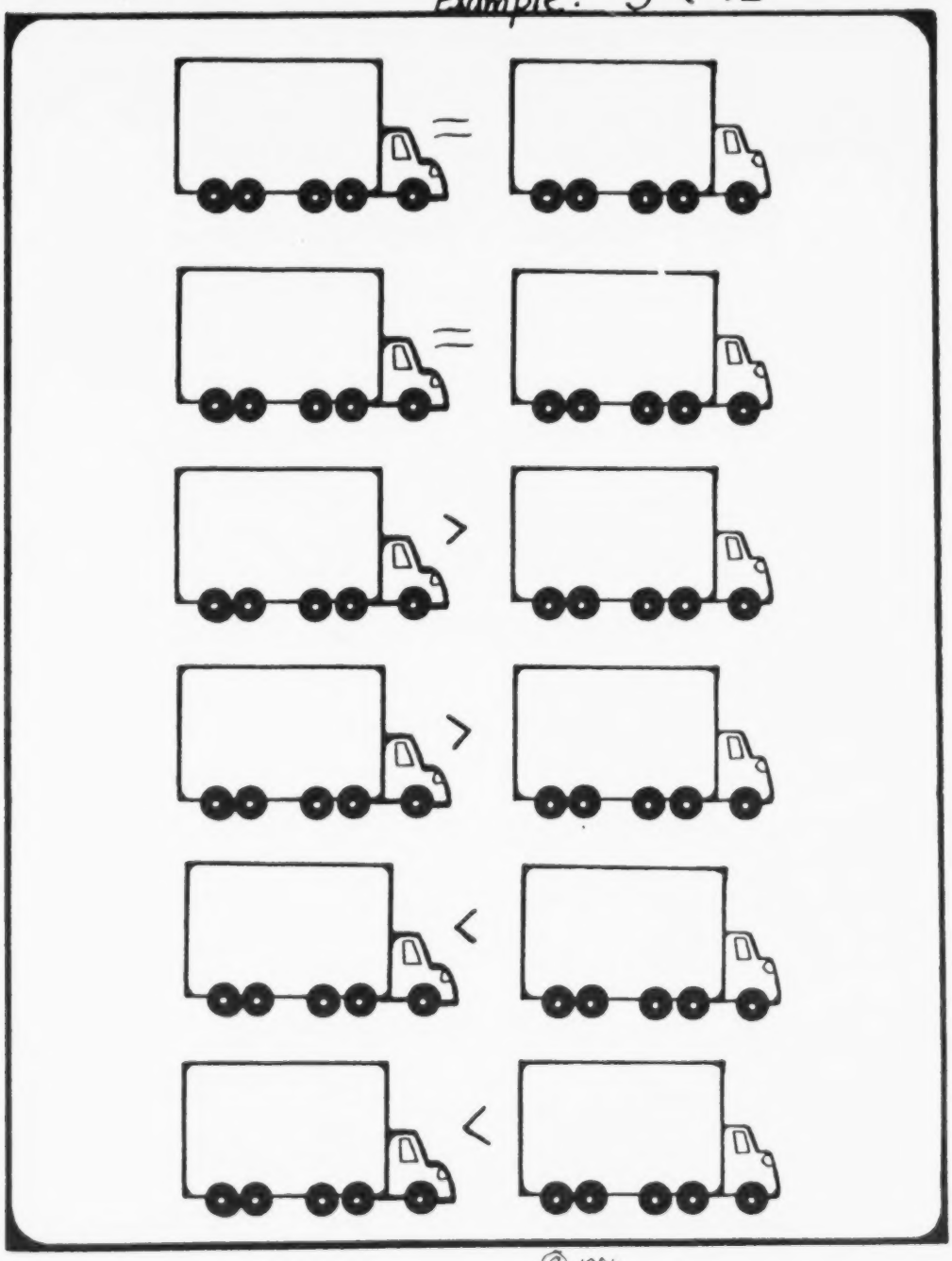
Name: _____ "Automatic" Color

1. Write the number of cars of one color in the first truck. and color the truck that color.
2. In the second truck write a fraction which makes the equation true.

Example: $5 < \frac{1}{2}$



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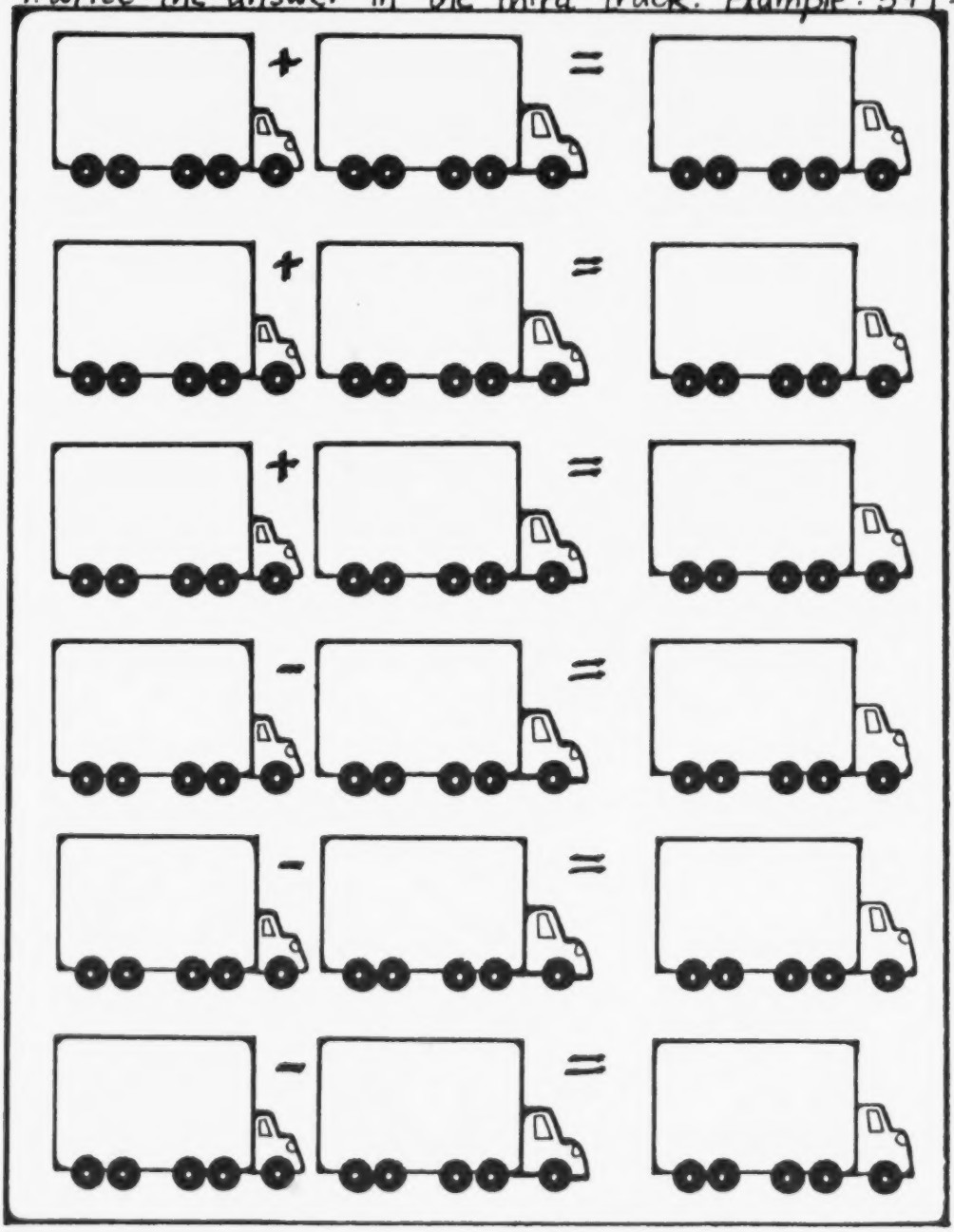
Name: _____ "Automatic" Color

1. Write the number of cars of one color in the first truck and color the truck that color.
2. Write the number of cars of a different color in the second truck and color it.
3. Add or subtract. (Watch the signs!)
4. Write the answer in the third truck. Example: 5+1=6



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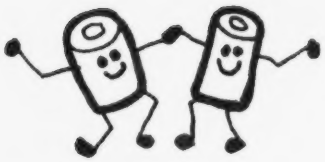
LET YOUR LIGHT SHINE



I. **Topic Area**

Batteries, flashlights, energy

II. **Introductory Statement**

Students will learn the parts of a flashlight and how to assemble the parts so that the flashlight works.

III. **Math Skills**

a. Whole number computation
b. Charting
c. Measuring mass

Science Processes

a. Observing
b. Gathering and recording data
c. Applying and generalizing

IV. **Materials**

One flashlight per group of six (or fewer) students
Student worksheet and pencils
Balance scale with weights
Samples of batteries in different shapes and sizes (optional)

V. **Key Questions**

1. What is inside a flashlight?
2. How do the parts of a flashlight work?
3. What does a battery do?

VI. **Background Information**

1. Batteries store electricity.
2. Do not attempt to test electrical currents using an outlet—always use a battery to prevent electrical shock.
3. Refer to "Inside a Battery" chart for further information.

VII. **Management**

1. This activity should take 30-45 minutes.
2. It should work well in small groups, or as an addition to the science center in the classroom.
3. If used as a class activity, demonstrate the procedure with a student helper first, then let the students work in small groups.

VIII. **Procedure**

1. Introduce the objectives of the lesson.
2. Caution students never to shine a light into anyone's eyes. Test the light on their hands.
3. Display the batteries and/or "Inside a Battery" chart. Discuss the battery and what it does.
4. Pass out student worksheet and flashlight(s).
5. Following the directions on the student sheet, students will weigh flashlight, record the data, and disassemble the flashlight. They will weigh the parts as directed and then re-assemble the flashlight, shining the light on their hands to see if the flashlight works.

X. **Discussion**

1. How must the batteries be placed in the flashlight? Why?
2. What are some other things which use batteries?
3. Why shouldn't you take apart something which is plugged into an electrical outlet?

XI. **Extensions**

1. Find other battery-operated objects to take apart and re-assemble.
2. Make a gadget which works using a battery.
3. Explore the use of switches in electrical wiring.

XII. **Curriculum Coordinates**

Language Arts

1. Write a class story describing the steps taken in this investigation.

Music

1. "You Light Up My Life"

Name _____

LET YOUR LIGHT SHINE

1. How much does the flashlight weigh?

_____

2. Take the flashlight apart. Be careful. Take everything out and set it on the table.

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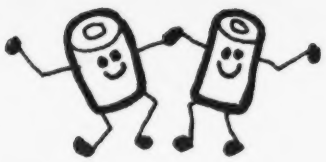
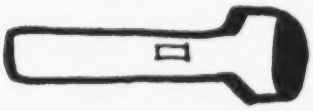
3. How much do the two batteries weigh?



_____

4. How much does the outside of the flashlight weigh?



_____

5. How much do the left-over parts weigh?

_____

6. Add it up. ____+____+____ = _____

7. Is it close to the same weight as the whole flashlight?

_____

8. Put the flashlight back together. Make sure that it works. Good luck!

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Inside A Battery Cell

Push the switch on a flashlight, and the light bulb goes on. How does it happen? The electricity to run the light bulb comes from a battery cell. This cell is made up of a carbon rod, a zinc can, and some chemicals which look like black paste.

Atoms are the building blocks of which everything is made. All atoms have smaller parts called electrons. Whenever you see, feel, or use electricity, the electrons move through a wire or some other conductor.

Electrons need a pathway to travel along. The button switch on a flashlight can open the pathway (on) or close the pathway (off). When the button is turned "on", a copper strip is pushed against the light bulb. The electrons can then move from the zinc to the carbon rod, and into the light bulb, and then return to the battery cell. When the electrons pass through the tiny wire inside the light bulb it becomes so hot that it glows brightly.

Turn the light switch "off," to close the electron's pathway, and the light no longer shines.

Once the chemicals in the black paste are used up, the battery will be dead and no longer can be used. If you wish to recharge batteries, you must purchase the rechargeable type of batteries.

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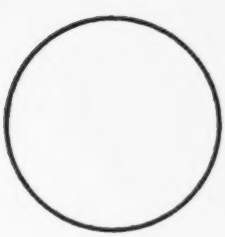

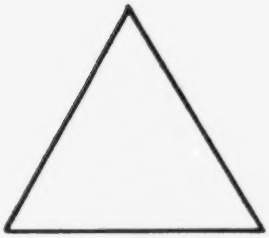

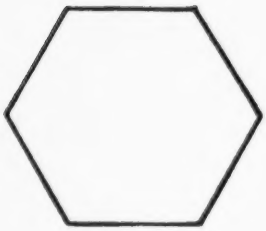

I. **Topic Area**

Fitting shapes together

II. **Introductory Statement**

How can we fit these shapes together leaving as little space as possible?

III. **Math Skills**

a. Geometry—shapes

Science Processes

a. Observing
b. Controlling variables
c. Applying and generalizing

IV. **Materials**

2 pieces of plain ditto paper for each child
6 hexagons—orange construction paper, per child
6 circles—green construction paper, per child
6 triangles—blue construction paper, per child
6 squares—red construction paper, per child
glue
baggies

V. **Key Question**

How can we put this figure together without having any space in between? Ask this for each shape.

VII. **Management**

1. Already have the shapes cut and placed in individual baggies containing 6 of each shape.
2. Use different colors for each shape.
3. It takes 25 minutes and it is a nice activity for the whole class.

VIII. **Procedure**

1. Give each child a baggie containing 6 of each shape.
2. Give each child two plain ditto papers and fold them in half.
3. On one paper put the hexagons and circles. On the other paper put the squares and triangles. (one shape per half)
4. Let them play around with the figures to try and get as little space in between as possible.
5. Once they are sure they are finished let them glue them on the paper.

X. **Discussion**

1. Which shapes fit the best together?
2. Which shape was the easiest to fit together?
3. Which shape was the hardest to fit together?

XI. **Extensions**

1. Discussion of different shapes of things around the room.

XII. **Curriculum Coordinates**

Art

1. Make a picture using a given number of shapes.

Music

1. Play musical shapes.

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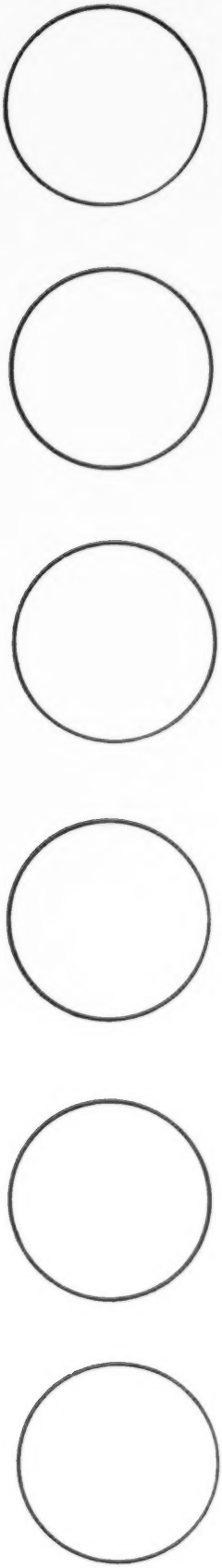
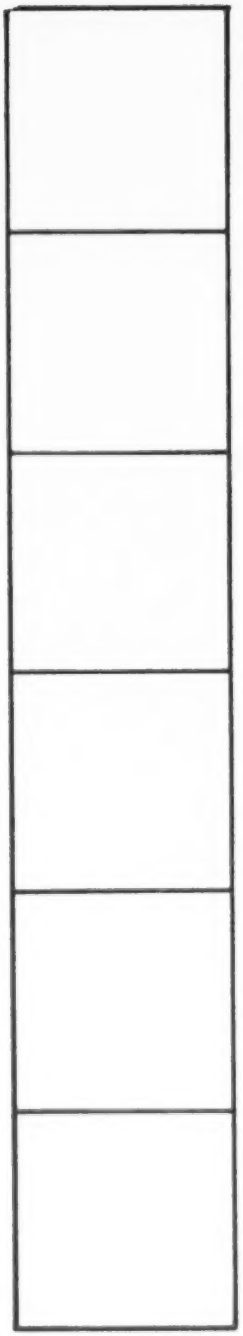
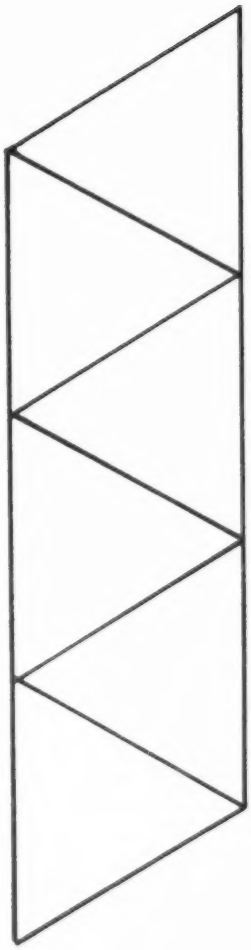
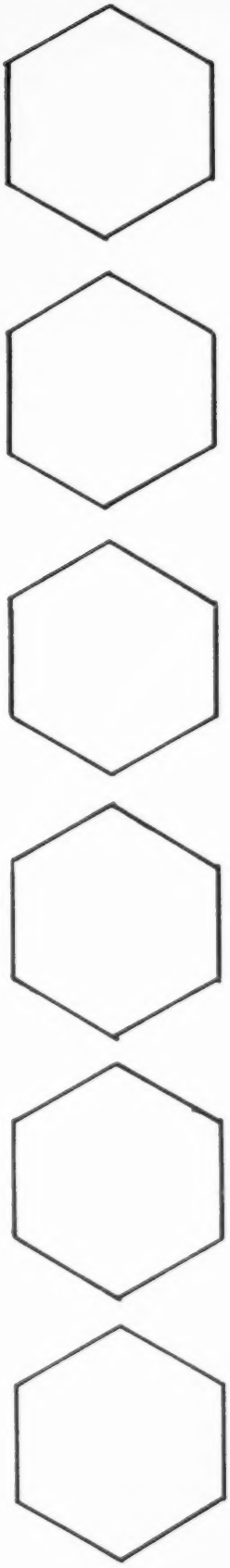
SIZING THINGS UP









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NO NON CENTS

I. **Topic Area**

Surface Tension

II. **Introductory Statement**

Students will observe how many drops of water can be placed on a Penny and Nickel before it will overflow.

III. **Math Skills**

a. Counting
b. Estimating
c. Comparing
d. Graphing

Science Processes

a. Recording data
b. Observing
c. Comparison
d. Estimating

IV. **Materials**

Cup of water
Penny
Nickel
Eye dropper
Student page
Red crayon
Blue crayon
Paper towels

V. **Key Question**

How many drops of water can I put on a coin before it overflows?

VI. **Background Information**

1. Approximately thirty to forty drops of water on a penny.
2. Approximately ten to twenty drops of water on a nickel.
3. Size of water drop will vary according to size of eye dropper.
4. Water is a polar atom formed by oxygen and hydrogen. A polar atom is one that has a positive charge on one end and a negative charge on the other. Since opposites attract the negative pole on one molecule of water attracts the positive pole of another. This attraction holds the water together like a net. This net holds the water together. When something falls in the water this net is stretched a bit. The water heaps up higher and higher until at last the net breaks. Then the water spills over.

VII. **Management**

1. This activity will take 45 minutes.
2. You should have paper towels under penny and nickel for water overflow.
3. Use a plastic eye dropper.
4. This activity may be used with a whole class or small group.
5. Students practice using eye dropper with a cup of water before doing this experiment.

VIII. **Procedure**

1. Students will estimate the number of drops a penny will hold before it overflows, record and graph.
2. Students take turns placing drops of water on penny, counting the drops.
3. Students will record results on graph.
4. Repeat steps 1, 2, and 3 with the nickel.
5. Compare graphs of penny and nickel.

X. **Discussion**

1. How many drops sit on a penny?
2. How many drops sit on a nickel?

XI. **Extensions**

1. Reverse the procedure, and take water off of coin with eye dropper and count the drops that you put back into cup.
2. Buy eye dropper at the drug store.
3. The head may hold more than the tail.
4. The tail may hold more than the head.
5. Soap in water will change the amount of drops a coin will hold.
6. Oil, lemon juice, orange juice, hot water, cold water, old money, new money will change the amount of drops a coin will hold.
7. Try various sizes of coins, and foreign money.
8. Try a flat surface object to see how many drops of water it will hold.

XII. **Curriculum Coordinates**

Language Arts

1. Write a story about a penny or nickel, and what it could buy, or not buy. Invent new money.

Art

1. Money rubbings
2. Draw what you could or could not buy with your penny or nickel, or what your new money looks like.

Music

1. I Have a Six Pence
2. King of the Road

Physical Education

1. How far will a penny or nickel roll? Measure how far it rolled.

Social Studies

1. How many mints in operation in the U.S.?

Geography

1. A map of the U.S.—locate on the map where the mints are.

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NO NON CENTS

DROPS OF WATER

45
40
35
30
25
20
15
10
5
0

Estimate Actual

Penny

Name

DROPS OF WATER

45
40
35
30
25
20
15
10
5
0

Estimate Actual

Nickel

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Litter, Litter, Everywhere!

I. **Topic Area**

Ecology, Pollution (Litter)

II. **Introductory Statement**

Students will become aware of the litter around them. They will discuss probable causes and determine a solution.

III. **Math Skills**

a. Counting
b. Graphing

Science Processes

a. Observing
b. Gathering and recording data
c. Classifying
d. Applying and generalizing

IV. **Materials**

large paper bag for each child
student worksheet
soap and water
newspaper (for table tops) and a littered area

V. **Key Question**

How can we find out what types of litter there are at our school, and what causes them?

VII. **Management**

1. Have a large area (outdoors) for students to clean.
2. Pair students up with partners.
3. Have large table top areas in classroom covered with newspaper for students to use.
4. Classtime—minimum of an hour—20 minutes prior discussion and 40 minutes for collecting litter, graphing and generalizing. (Could be done in two sessions)

VIII. **Procedure**

1. *Introduction*
   a. Talk about different types of pollution. (Water, air, noise, land litter, chemical, etc.)
   b. Is there a type of pollution around us that we can do something about?
   c. Make sure the students realize that litter is a form of pollution.
   d. Discuss what it would be like if no one ever picked up the garbage.
   e. Would you rather have a clean school or a dirty school?
   f. (Key Question) How can we find out what types of litter there are at our school, and who causes them?
2. *Activity*
   a. Divide class into pairs of students. Give each pair a large paper bag. (Have plenty of extras on hand).
   b. Go out to a littered area and give the students a set amount of time (15 minutes works well). Have students pick up as much litter as they possibly can.
   c. When the time is up, have them return to the room with their litter. Each pair of students should have their own area to dump out their garbage.
3. *Interpretation*
   a. Have the students discuss categories into which their garbage might fit. (If they have trouble with this, you might give such suggestions as; wrappers, paper, cans, plastic or school papers). Have the students arrange their garbage into categories.
   b. After students have their categories and piles, have each of them transfer the categories and the number of items in these categories onto their graphs.

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X. **Discussion**

1. Discuss who might have left this garbage. "Do you suppose your parents dropped the schoolwork?" "Did you leave the beer can?" etc.
2. Discuss how everyone is guilty and how we have to let them know that they have to stop.

XI. **Extensions**

1. Weighing garbage
2. How much is recyclable
3. Recycle cans
4. Businesses-recycling for energy
5. Biodegradable

XII. **Curriculum Coordinates**

Art

1. Draw a picture of how the school looked before and after they picked up.
2. Draw posters to encourage people to not litter.
3. Make a garbage collage.

Music

1. Song—"This is the way we..." using and acting out cleaning up.

Physical Education

1. Have a litter race to see who can pick up the most litter in a set period of time.
2. Trash relays

Language Arts (creative writing)

1. Have students write a story about a land full of litter and pollution and a story about a clean land.
2. Read Bill Peets "Wump World".

Social Studies

1. Look at and discuss study prints on pollution.
2. Make posters.
3. Take a trip to a recycling center.

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Litter, Litter, Everywhere!

Name _____

Category	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36

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PITS on a roll

I. **Topic Area**

Physics: Motion down an incline plane

II. **Introductory Statement**

Students will observe the difference in the distance rolled by an olive can when its contents are altered.

III. **Math Skills**

a. Graphing
b. Measuring
c. Estimating

Science Processes

a. Recording data
b. Observing
c. Comparing

IV. **Materials**

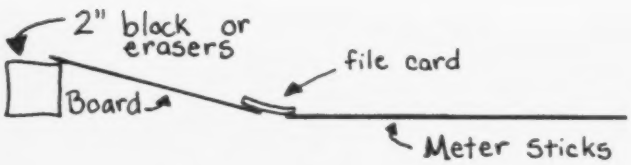
Containers
Meter sticks
Paper towels
Crayons—2 colors
Student page
1 index card
Can opener—regular
Can opener—punch type
1 board 6" wide, 18-36" long
2 " block of wood or 2 black board erasers
1-7¾ ounce can of olives (or any type of fruit)

V. **Key Question**

How far will the full can roll in comparison to the can with just olives in it or the empty can?

VII. **Management**

1. This activity may be done in conjunction with "Pits-a la-Can".
2. This activity will take two sessions of 45 minutes each.
3. Clear floor space for incline plane, and for measuring the distance the can rolls.
4. This activity may be used with a whole class or small group.
5. To construct an incline plane, rest board on a 2 inch block or 2 erasers as shown here, tape index card at bottom of board to continue a smooth roll.



VIII. **Procedure**

1. Students will estimate how far the full unopened olive can will roll down the incline plane, record, and graph on student page.
2. Students will place full unopened olive can on the incline plane block, let the can roll down the incline plane and measure the centimeters that it rolled, record and graph on student page.
3. Teacher will help student open can with punch type opener, and pour all of liquid into another container.
4. Students will estimate how far the can containing only olives will roll down the incline plane, record, and graph on student page.
5. Students will roll can containing olives only down the incline plane, record, and graph distance the can rolled from the bottom of the incline plane.
6. Teacher will remove can lid, using regular can opener, and put olives in another container.
7. Repeat steps 4 and 5, using empty olive can.
8. Students will compare difference in the 3 distances.

X. **Discussion**

1. What caused the can to roll different distances?

XI. **Extensions**

1. Do the lesson changing the height of the incline plane instead of the contents of the can.
2. Use different variables: size of can, weight of can, contents—solid, liquid, oil.

XII. **Curriculum Coordinates**

Language Arts

1. Students may write a story of being in a can, and describe what food they are.

Art

1. Have students design own food label for a can.

Music

1. Food songs

Physical Education

1. Try various rolling exercises
2. Use a hill as an incline plane.

Social Studies

1. Look at the food that is grown in your state, or another state where food is grown. Visit a cannery.

Geography

1. On a map of your state color in the areas where different types of food is grown.

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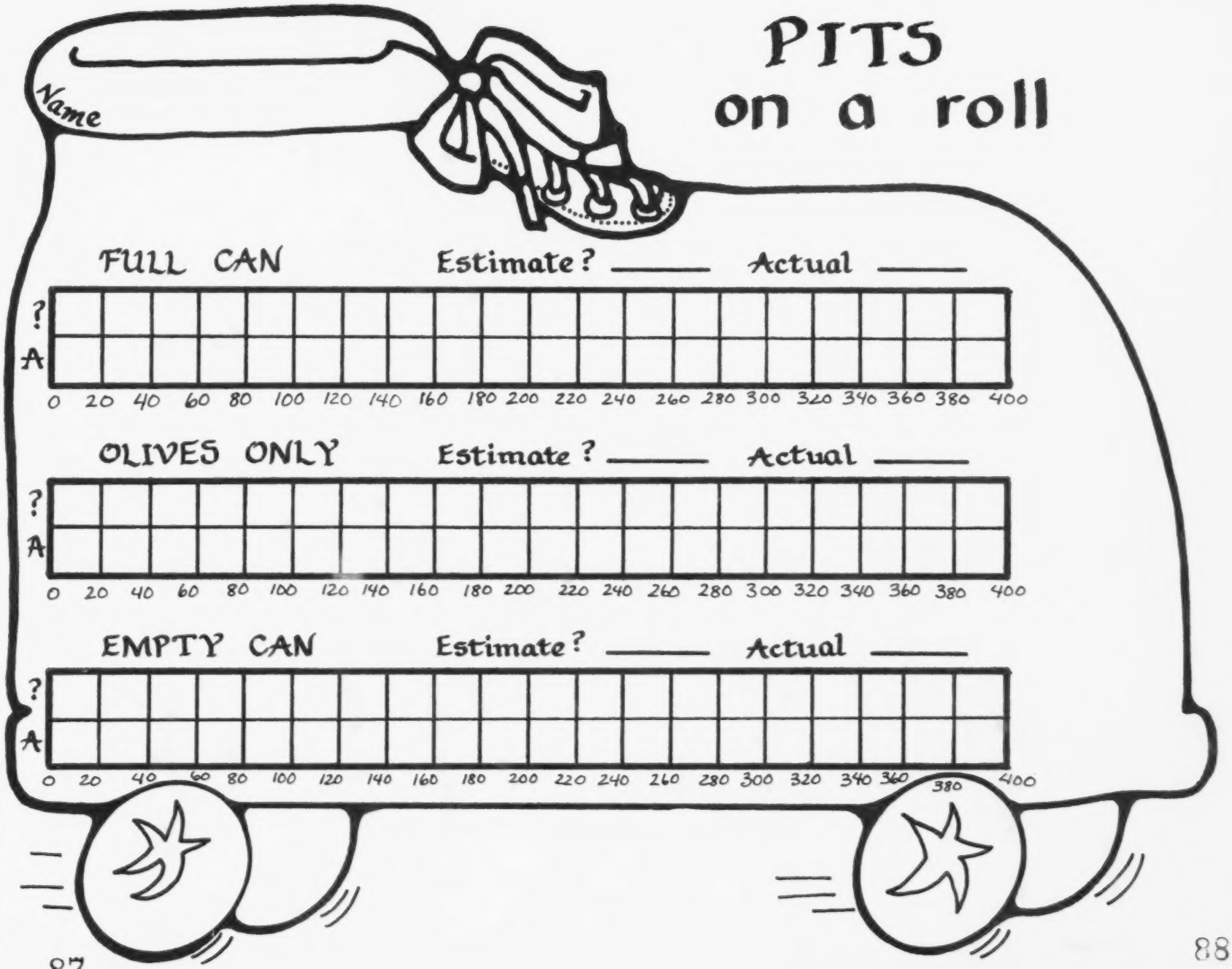

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PITS ala Can

I. **Topic Area**

Comparison of Mass

II. **Introductory Statement**

Students will observe what is in an olive can, and compare the weights of the different parts.

III. **Math Skills**

a. Counting
b. Measuring
c. Graphing
d. Estimating

Science Processes

a. Recording data
b. Observing
c. Comparison

IV. **Materials**

1-7¾ ounce can of olives (or any type of fruit)
Scale-balance and weights
Measuring cup
2 containers—to hold fruit content
Can opener
Crayons—2 colors
Student pages
Paper towels

V. **Key Questions**

1. How much does the can of olives weigh?
2. How much do the olives weigh?
3. How much does the liquid weigh?
4. How much does the empty can weigh?
5. How many olives do you think are in this can?

VI. **Background Information**

1. Olives both green and black are cured in a Brine.
2. You can cure olives yourself.
3. Olive are cooked in the can.
4. Olives are canned according to size.
5. Olive trees live for a long time, and have fruit for many years.
6. Olives bloom in May.
7. Olives are picked by hand in October.
8. *Do not* eat olives off the tree, for they taste bitter.
9. You can not grow olive trees in the same ground that tomatoes or cotton have been planted in, because of disease.
10. The olive seed is called a Pit.
11. Olives are a fruit.
12. Olives are pruned in early spring due to cold weather.

VII. **Management**

1. This activity may be done in conjunction with "Pits-On-A-Roll."
2. This activity will take two 1 hour sessions.
3. This activity may be taught as a whole class activity or in small groups.

VIII. **Procedure**

1. Students will estimate the weight of the unopened can, record on student page and graph their estimate.
2. Students will weigh the can, record the weight and graph results.
3. Teacher will help student open can and drain liquid into one container and olives into another container.
4. Students will record their estimate of the weight of the empty can and graph.
5. Students will weigh empty can with both lids, record and graph.
6. Repeat steps 1, 2, and 3 weighing all the olives, and weighing all the liquid.
7. With teachers help students will total the weight of the can and its contents.
8. Students will record their estimate of the olives in the can and graph.
9. Students will count olives, record and graph.

X. **Discussion**

1. Why were there more olives than numbered advertised on the label?
2. Did the liquid weigh more or less than the olives?
3. Do all the contents and the can equal the original weight of the unopened can?

XI. **Extensions**

1. Study how olives and other foods are canned.
2. Compare stated minimum contents with actual contents of various food items.

XII. **Curriculum Coordinates**

Language Arts

1. Write a recipe which includes olives, and prepare in classroom. Write to Lindsay Ripe, Lindsay, California for more information.

Art

1. Create a creature with olives or other foods.

Music

1. Food songs

Physical Education

1. Act out how a tree grows.
2. Act out olives being picked.

Social Studies

1. Countries or state that grow olives—Israel, Spain, France, Greece, Italy, Mexico, and California.

Geography

1. Secure a map of one of the countries or state listed above. Why do olive trees do well there? Olives are processed differently in California than in other countries.

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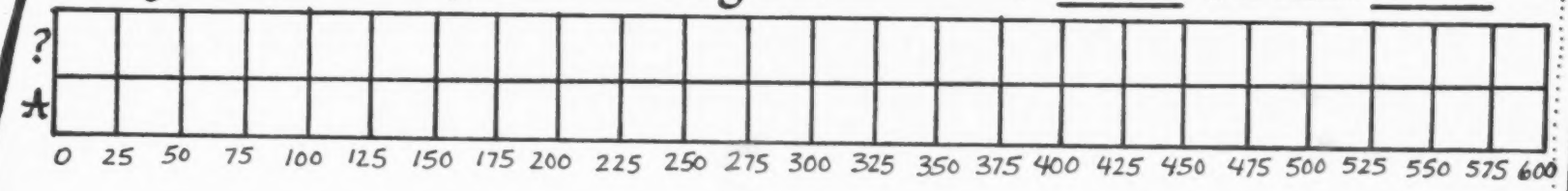
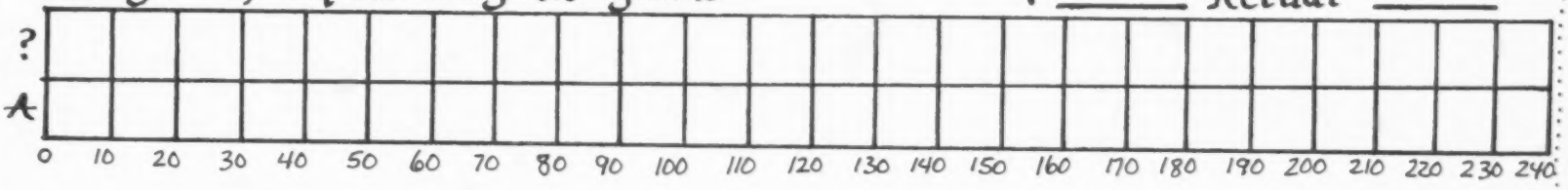
PITS ala Can

Name _____

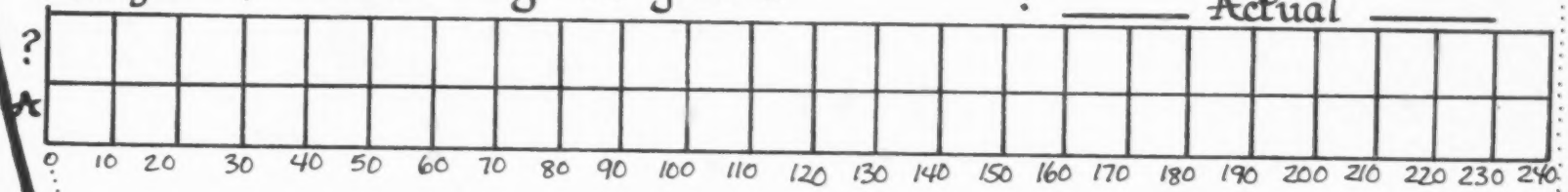
Weight of can of olives in grams ? _____ Actual _____



Weight of liquid only in grams ? _____ Actual _____



Weight of olives only in grams ? _____ Actual _____



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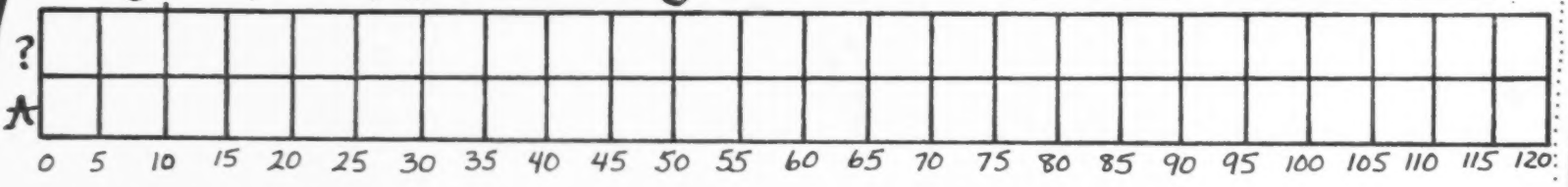
PITS ala Can

Name _____

Weight of empty can in grams ? _____ Actual _____



Do the parts equal the whole? _____

Liquid _____ grams

Olives _____ grams

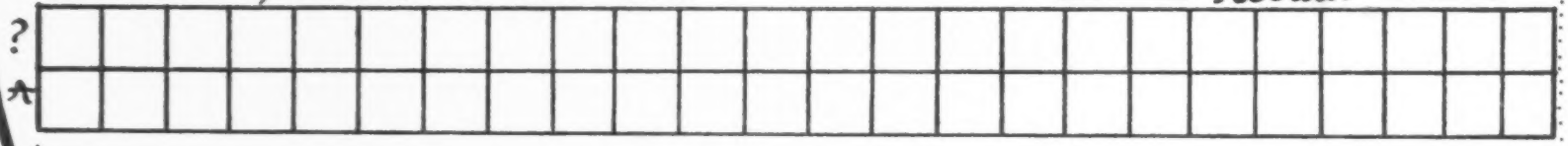
Empty Can _____ grams

Total _____ grams

If the parts do not equal the whole, find the difference.

_____

Number of olives in the can ? _____ Actual _____



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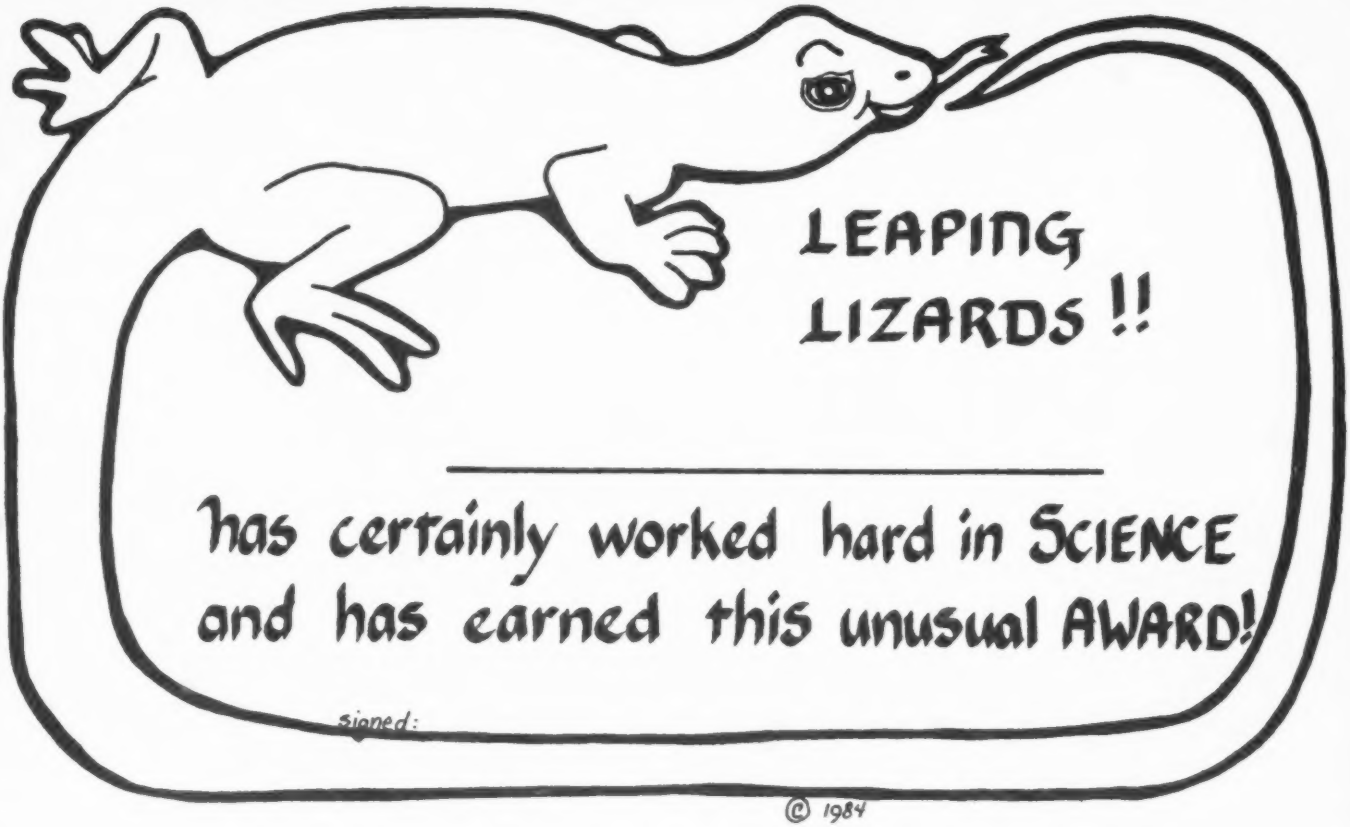

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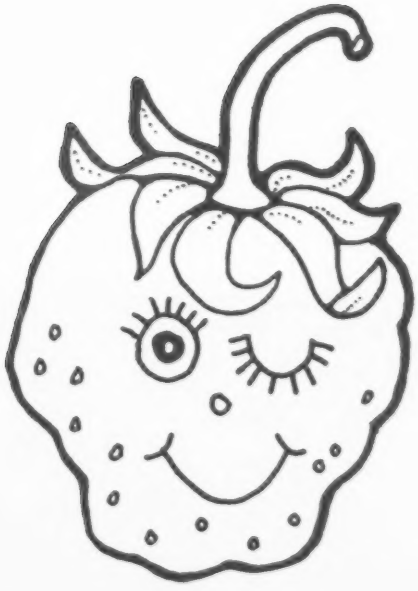

_____

is a
Berry Good
Science Student!

_____

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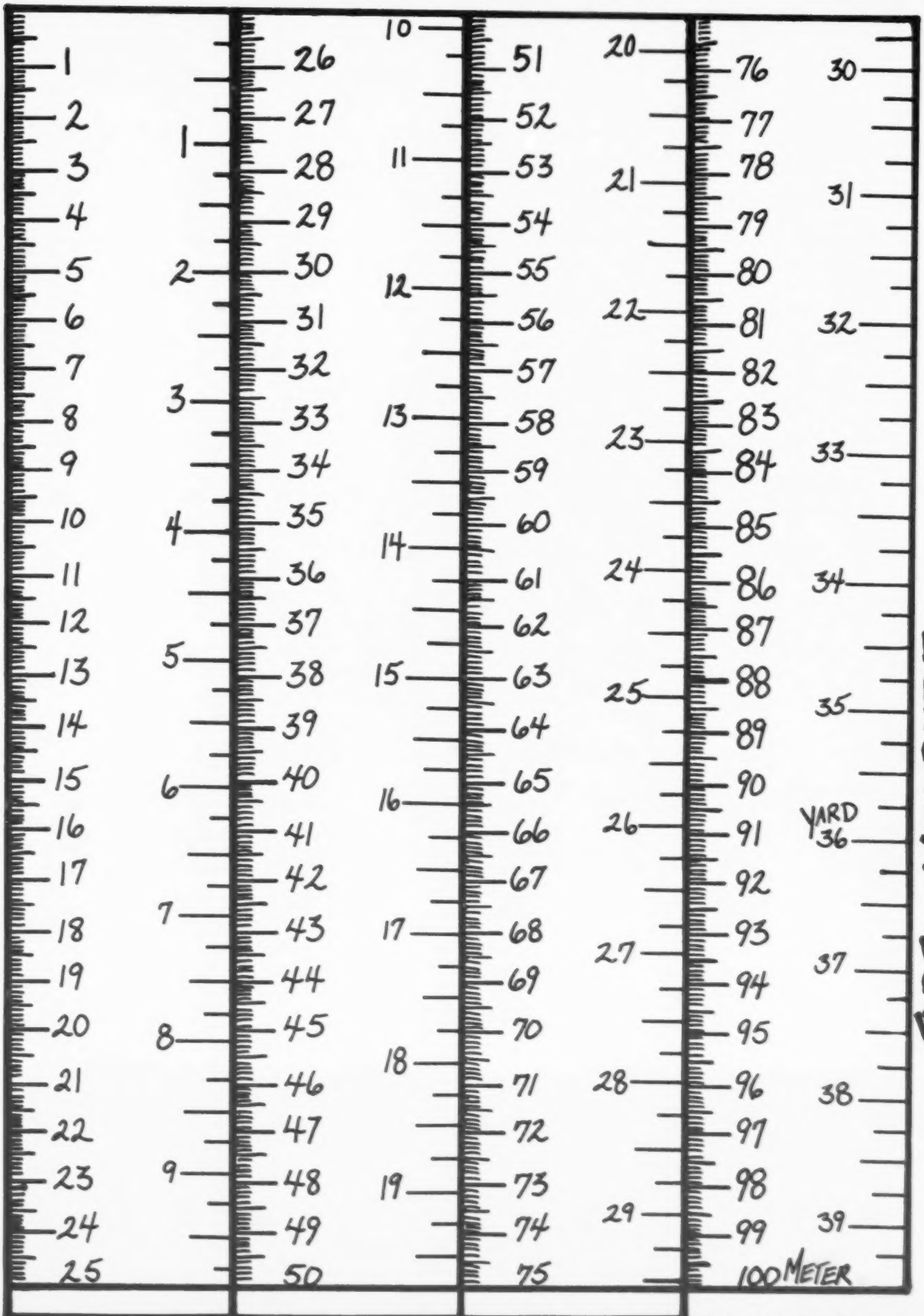

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